

# NETWORK WORLD

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## ► ADVANCED SERVICES

# N.E. Tel readies virtual net option

BY JIM BROWN  
New Products Editor

BOSTON — New England Telephone and Telegraph Co. is bidding to become the first Bell operating company to offer a virtual network service.

The carrier's V Path Custom Network Service will be based on CCITT Signaling System 7 (SS7) technology. If the service is approved by the Massachusetts Department of Public Utilities (DPU), New England Telephone will begin marketing it on Jan. 14 to custom-

ers with businesses located in the Eastern Massachusetts local access and transport area.

The service is aimed at customers using 50,000 minutes or more of calling services per month and having at least four physical locations in the Eastern Massachusetts LATA. "As demand surfaces in other areas, we will evaluate the wisdom of rolling the service out to those areas," said Charlie Duffy, V Path product manager.

The service will enable customers to replace private lines with switched network services while  
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## ► ACCESS ALTERNATIVES

# Firm forms bypass net subsidiary

*Merrill Lynch unit targets key cities.*

BY KARYL SCOTT  
Washington, D.C. Correspondent

WASHINGTON, D.C. — Merrill Lynch and Co., Inc. recently formed a new subsidiary to build bypass networks in as many as 15 major U.S. cities to compete with regional Bell holding companies.

The new company, Merrill Lynch Teleport Technologies, Inc. (MLTTI), will fund the construction over the next two years of networks that will provide T-1 and special access services to corporate users and long-haul carriers.

The plan is an attempt to replicate the New York City network operated by Teleport Communications Co., which is principally owned by Merrill Lynch, according to Robert Atkinson, vice-president of external affairs at MLTTI.

Industry analysts praised the move, saying it may give users a viable alternative to RBHC services. "Competition in the local exchange will give users control," said Jeremy Frank, program direc-  
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## ► ANALYSIS

# Industry hit by merger mania in '87

## A busy year for mergers and acquisitions

	Date	Price
Bolt, Beranek and Newman, Inc. acquires Network Switching Systems, Inc.	March	\$18m
Hughes Aircraft Co. acquires M/A-Com, Inc.'s Telecommunications Division	May	*
Digital Communications Associates, Inc. acquires Fox Research, Inc.	June	\$10m
Micom Systems, Inc. buys Spectrum Digital Corp.	June	\$25m
Contel ASC buys Equatorial Communications Co.	July	\$56m
3Com Corp. agrees to merge with Bridge Communications, Inc.	July	**
MCI Communications Corp. buys RCA Global Communications, Inc.	September	\$160m
Dowty Group plc buys Datatel, Inc.	November	\$40m
Unisys Corp. acquires Timeplex, Inc.	November	\$350m
Vodavi Technology Corp. buys Contel Corp.'s Executone unit	December	\$60m
Vodavi agrees to merge with ISOETEC Communications, Inc.	December	**

\*Not disclosed

\*\*Not applicable

NETWORK WORLD CHART

BY PAM POWERS  
Senior Editor

The flurry of mergers and acquisitions in the communications industry during 1987 created powerful new players that will redefine the nature of competition in key market segments for years to come.

The markets for T-1 multiplexers, local networks, and very small aperture terminal satellite network equipment were among the industry segments most affected by the rash of mergers and acquisitions last year.

While analysts are dubious about some of the deals made during the year, they said most will strengthen the companies involved and make it tougher for the remaining independent vendors to compete.

The T-1 multiplexer market underwent the  
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## NETWORK LINE

### News

► TRW Information Networks Division prepares to unveil a line of TCP/IP-based networking products in an effort to grab a bigger share of the local net market. Page 2.

► Tymnet, McDonnell Douglas Network Systems and GE Information Services separately announce the first direct links to value-added networks in Japan. Page 2.

► A survey of 250 telecom managers finds that nearly two-thirds don't understand IBM's new 9751 PBX and 19% didn't even know it was announced. Page 2.

► Georgia-Pacific upgrades its network to get faster access to key market information from its sales outlets. Page 7.

### Features

► This week's Management Update explores the ways users lay down the law to vendors in their RFPs and RFIs. Page 24.

## ► LOCAL NETWORKS

# LAN helps control air traffic

BY MARY PETROSKY  
Senior Correspondent, West Coast

CAMBRIDGE, Mass. — The U.S. Department of Transportation (DOT) has implemented a local network-based prototype of an advanced air traffic tracking system designed to help

planners prevent flight delays.

Like DOT's current air traffic tracking system, the prototype system draws on data collected from 20 regional Air Traffic Control Centers. But while the current system generates lists of data on aircraft posi-

tions and flight plans, the prototype system creates a graphic "snapshot" every three minutes of all the U.S. air traffic that is monitored by the Federal Aviation Administration. The prototype was created by the DOT's Transporta-  
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## FEATURE FOCUS

# Bandwidth needs strain nets

BY JOSH GONZE  
Senior Writer

Data-intensive communications applications such as full-motion video, digitized graphics and even distributed data bases are helping many firms gain competitive and economic advantages. How-

ever, the bandwidth needs of these state-of-the-art applications are creating bottlenecks in communications pipelines, choking the flow of vital information and straining network capacities to their limits.

Distributed data bases provide a prime  
Continued on page 27



► **PRODUCT PREVIEW**

# TRW readies line of TCP/IP net products

BY MARY PETROSKY

Senior Correspondent, West Coast

TORRANCE, Calif. — TRW Information Networks Division plans to roll out later in January a new line of networking products based on the Transmission Control Protocol/Internet Protocol.

The products, which will include a series of bridges, personal computer network adapters and network management tools, are

part of an aggressive attack on the local- and wide-area networking markets. The products are expected to be demonstrated at the Communication Networks Conference and Exposition (COMNET) in Washington, D.C. Jan. 25 to 28.

With its new line, TRW is "moving away from proprietary protocols," said Wayne Martson, director of marketing and sales. In addition, these new products were "built with network management

in mind," Martson said.

TRW is a systems integrator that designs and installs very large networks.

TRW has opted to design and manufacture its new line, rather than purchase network components — such as bridges and adapters — from other vendors, as it does for its current line. Early in 1987, the company announced the first major piece of its new line, the Advanced Connector Unit (ACU) 2000 communications server, which runs TCP/IP. It began shipping this fall.

At COMNET, TRW will unveil the NB2000 series of net bridges. The 11 bridges in the line operate transparently to higher level pro-

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Sharp-eyed readers may have noticed a change in the tag line below the *Network World* banner on page 1.

The new tag line — "The newsworthy of user networking strategies" — more accurately reflects the *Network World* mission: to provide information about the strategic application of network technology at leading companies.

*Network World* is designed to help you digest news, recognize trends and keep in touch with how businesses are using networking to change the way they do business.

Our new tag line has really been our motto all along.

► **VAN SERVICES**

## Tymnet, GE offer links to Japan

BY PAM POWERS

Senior Editor

Citing continuing deregulation of the Japanese communications industry, two U.S. value-added network (VAN) carriers recently announced direct links to Japanese carriers, bypassing international record carriers.

Tymnet, McDonnell Douglas Network Systems Co. said it would offer service to Japan via its Japanese affiliate, Network Information Service Ltd.; and General Electric Information Services announced a direct connection to NEC Corp.'s network in Japan.

Both moves were made possible by a recent Japanese Ministry of Post and Telecommunications ruling that permits U.S. and Japanese carriers to sidestep international record carriers.

Tymnet can now provide its full range of data communications services both within Japan as well as between Japan and the U.S.

### Other services to come

A Tymnet spokesman said the Japanese VAN can now offer a number of domestic Tymnet services, but some services, such as protocol conversion, are not yet supported between the countries.

"This is a significant business opportunity for us. U.S. corporations with offices in Japan would like to take advantage of the full range of packet-switching services," the spokesman noted.

GE Information Services' link with NEC also bypasses the international record carriers. GE Information Services' worldwide teleprocessing network, called Marknet, now can be accessed from

nearly 200 locations in Japan, 650 locations in the U.S. and from locations in more than 80 other countries.

### E-mail service saves money

The first service offering on the network is GE Information Services' electronic mail service, Quik-Comm. The cost of sending a 1,500-

character E-mail message from Japan to the U.S. via Quik-Comm is about 40% less than the cost of sending an international telex, the company said.

A GE Information Services spokesman said the Quik-Comm service is available now to NEC's Japanese clients, and that other Marknet services will be available to the Japanese in the near future. The company would not forecast how much revenue the venture will generate for GE Information Services. □

► **SURVEY**

## Users puzzled by 9751

*Many don't grasp IBM switch's benefits.*

BY JIM BROWN

New Products Editor

MILWAUKEE — IBM needs to do a better job of explaining how its new 9751 private branch exchange will benefit users if Big Blue is to persuade telecommunications managers to buy the switch, according to a spot survey of 250 users in the Midwest.

Testing the old adage that first impressions are lasting ones, the survey set out to measure how members of various Midwestern telecommunications associations reacted to the switch's introduction. The survey, published by the consulting firm of Patrick Monahan & Associates, Inc., based here, found that two-thirds of the respondents didn't understand the technical differences between the 100 to 20,000-line 9751 Business

Communications System introduced in October and existing Rolm Corp. CBX II switches.

The survey also found 19% of respondents were not even aware the product had been introduced. More than half of the respondents said they currently own or lease Rolm systems.

Patrick Monahan, president of the consulting firm, said the survey indicates that, if IBM wants current Rolm CBX II users to add 9751s to their networks or to get other users to swap other vendors' PBXs for Big Blue's, it will have to do a better job of explaining how the switch works. It will also have to translate the changes in switch architecture to tangible benefits.

"There is going to have to be an effort on the part of IBM to explain the product further. I'm not sure

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## Call to readers

*Network World* wants to make its news coverage even better, and for that we ask your help. If you learn about an interesting event that just occurred or is about to occur, please give us a call.

We'd also like to hear about unusual network applications and how you're optimizing your networks for performance or savings. Call *Network World* Editor Bruce Hoard toll free at (800) 343-6474, ext. 726.



► **FACTORY NETWORKING**

# GM Canada to build MAP 3.0 net on fiber

*Use of 3.0 may require later upgrade.***BY PAULA MUSICH**  
Senior Editor

OSHAWA, Ontario — General Motors Corp.'s Chevrolet-Pontiac-Canada (CPC) plant here is installing one of the first production networks based on Version 3.0 of the Manufacturing Automation Protocol, *Network World* has learned.

The network, which is based on interpretations of the still-evolving 3.0 standard, is unusual because it is being built on fiber optics instead of MAP-standard coaxial cable.

Although GM officials and personnel involved in the project refused to comment on the installation, Mike Kaminski, MAP program manager for GM, admitted that a fiber-based "pre-3.0" network was being installed at the Oshawa plant.

The network will connect 150

Allen-Bradley Co. PLC-3 programmable controllers, most of which will support an automated guided vehicle system that will carry car bodies — probably Buick Regals — through the production process,

Kaminski expressed reservations about the CPC plant's decision to use products based on the unfinished MAP 3.0 specification. "What's being implemented at Oshawa and the final products that will come out next June or July are going to be different," he said.

according to sources.

Although Allen-Bradley would not say who its customer is or release many details on the project, it admitted that it has a \$1 million contract with "a major automotive supplier."

The company also said the project is the first implementation of MAP that supports programmable

controllers. Previous MAP networks connected only computers running factory applications, Allen-Bradley said.

The fiber-optic modems and transceivers that will link the programmable controllers will be supplied by Thomas and Betts Corp. of Raritan, N.J., according to a source close to that company.

The fiber-optic components comply with all of the recommended interfaces for MAP 3.0, the source said. Allen-Bradley said the optical fiber subsystem being used in the installation conforms to IEEE

802.4H specifications.

The Allen-Bradley components to be used in the installation are based on an initial version of MAP 3.0, which was released in April. A final version of MAP 3.0 won't be completed until July 1988.

Kaminski expressed reservations about the CPC plant's decision to use products based on the

unfinished MAP 3.0 specification. "What's being implemented at Oshawa and the final products that will come out next June or July are going to be different," he said. "If you try to make what they're installing talk to what comes out in June, it could be difficult."

To finalize the specification, participants in the MAP/Technical Office Protocol effort must perform conformance and interoperability testing.

Those tests detect errors in vendor implementations of the specification and show up errors or inaccuracies in the specification itself, Kaminski said.

Any errors found in the specification will have to be corrected. "There will be errata in that process, and we will update the spec and finalize it before we put out the finished version of 3.0," Kaminski said.

Allen-Bradley said it expects significant changes to be made in the network management and manufacturing message service portions of the specification. It is tracking those changes in preparation for a final, complete software upgrade when the specification stabilizes.

**Update plans**

Allen-Bradley plans to update the product implementations of the 3.0 specification when conformance tests become available some time after the MAP/TOP enterprise networking event planned for this summer.

Kaminski also expressed doubts about the wisdom of the CPC plant's decision to use optical fiber. Although a special interest group within the MAP/TOP users group is investigating the need for fiber in manufacturing applications, MAP specifics use of only coaxial cable broadband and carrier band technologies.

"There are 20 different vendors that participate with the users in the special interest group," Kaminski said. "Each one of them has a different connector, and each one wants to sell its own connector. If you put one vendor's equipment on a network, you'll have a tough time trying to plug some other equipment in because of the difference in the connectors," he said.

A source close to the Canadian operation maintained that the manager responsible for the project has always believed fiber-optic cable is more effective for manufacturing applications because of its immunity to electromagnetic interference and because of its flexibility. "He did the only MAP 1.0 network ever installed over fiber," the source said.

Another source said coaxial cable had been considered but that plant and cost constraints required the use of fiber. Using coaxial cable would have required the installation of new cable trays, because existing trays contain power cables that create electromagnetic interference. Because fiber is immune to such interference and could be installed in existing trays, it was believed to be more cost-effective. □

► **BUSINESS STRATEGY**

# Airlines join in network subsidiary

**BY PAUL KORZENIOWSKI**  
Senior Editor

KANSAS CITY, Mo. — In concert with a trend in the airline industry, two large airlines recently formed an independent subsidiary to run the internal networks of both carriers and to explore new business opportunities.

PARS Services Partnership is a joint venture between Trans World Airlines, Inc. (TWA), which ran the fourth largest airline reservation system, and Northwest Airlines, Inc. Northwest, which did not have a reservation system, last year injected \$140 million into TWA in return for 50% ownership of PARS.

Together, the airlines plan to offer various network products and services. "We forged the joint venture so we would be better able to move into new businesses," said Michael Lewis, vice-president of communications at PARS Services Partnership. "Our worldwide network supports more than 30,000 terminals. We want to open that asset up to other companies, such as ticketing agencies, hotels and car rental businesses."

The network enables travel agents to book reservations for a variety of airlines. In return, agents pay PARS a fee for each transaction. Employees at both airlines can also access and exchange information about flight arrivals, delays or cancellations.

Private lines are used to connect travel agents and airline employees to one of a dozen concentration points across the country. The concentration sites are connected by

56K bit/sec digital lines to TWA's central processing site here, which processes reservation and flight information.

In an effort to cut costs, PARS is considering replacing concentration sites with subrate multiplexing services provided by carriers, according to Doc Livingston, director of operations and support at PARS Services Partnership.

Subrate multiplexing services are provided from carrier central office switches. Low-speed analog private lines are brought together at the switch and multiplexed into a 56K bit/sec digital link running back to Kansas. Use of multiplexing services means PARS does not have to purchase and maintain concentration sites. It also puts the onus of network repair on the shoulders of Pacific Bell, which means that PARS does not have to staff each remote location.

Livingston said PARS first experimented with the subrate multiplexing services in conjunction with Pacific Bell. That work was so successful that PARS later convinced AT&T to offer the same service in Manhattan.

Since the service was installed last summer, network problems there have been reduced significantly, Livingston said. Previously, a New York travel agent's call had to pass through TWA's New York offices, a number of New York Telephone Co. central offices and a New York concentration point managed by AT&T before reaching the Kansas processing site.

With the AT&T service, the call goes directly to the concentration

point and bypasses New York Telephone and TWA's New York office. "Any time you cut nine hops off a link, service will improve," Livingston said.

PARS may use subrate multiplexing services at additional locations. Livingston said Pacific Bell is ready to offer the service in San Francisco and San Diego. The service is available in the Midwest from Southwestern Bell Co.

In addition to experimenting with the multiplexing service, PARS is replacing some 56K bit/sec lines with T-1, 1.54M bit/sec digital facilities. The company is currently installing three sets of two or more T-1 lines between various locations. The first set links TWA's data center with Northwest's center in Minneapolis. PARS plans to install a second pair between its New York offices and Kansas City. A third set will link a Los Angeles concentration point to the central site.

Each connection includes redundant paths provided by different carriers. Data transmitted from New York to Kansas City, for example, may be supported on T-1 facilities provided by LDX Net, Inc. A mirror path may use AT&T T-1 facilities from Kansas City to Pittsburgh to New York.

"We need a network with no common points," Livingston said. "If we took a hit on a common point, we would be out of business." The company may expand the T-1 network to other locations, a process that will probably stretch out to summer 1988.

The network is designed to give  
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► PUBLIC UTILITY COMMISSION RULING

# GTE, Pacific Bell must reduce rates, revenues

BY JOSH GONZE  
Senior Writer

SAN FRANCISCO — California's two major local exchange carriers will be forced to reduce their 1988 rates and revenues under an interim ruling issued last week by the California Public Utility Commission (PUC).

The decision orders Pacific Bell to reduce its annual revenue by \$86.4 million and GTE California to cut its 1988 revenue by \$122.6 million. It also mandates that GTE California reduce its current rate of return from 13.5% to 12.5%.

The ruling requires Pacific Bell, the state's dominant carrier, to enact retroactive rate cuts for 1986 and 1987.

Those cuts may lead to rebates for both business and residential

customers, according to Lou Andregio, project manager at the California PUC. "At this point, we're talking only about adjustments in surcharges or credits," Andregio said.

The PUC's justification for the reductions is that rates of return are too high and that users should benefit from extensive network improvements recently completed by the two carriers, according to Marty O'Donnell, project manager at the California PUC.

Pacific Bell officials expressed disappointment with the decision and said they may appeal the ruling.

"We believe we presented compelling evidence to the commission that further rate reductions weren't warranted," said Lou Saviano, a spokesman.

GTE California, in contrast, said the revenue reduction was acceptable but protested the reduction in its allowable rate of return. "The revenue reduction is reasonable, but we find the new rate-of-return level approved by the PUC inconsistent with current economic conditions," said company spokesman Larry Cox.

"We feel there is so much volatility in the national economy right now that the authorized rate of return doesn't fit it," Cox added.

The Pacific Bell spokesman said the company was particularly concerned about retroactive rate makings, which are rate rulings that affect past billings.

The issue is currently before the California Supreme Court under an appeal Pacific Bell had filed for an earlier retroactive rate ruling, he said.

In 1987, the PUC reduced revenues at GTE California by \$54 million and at Pacific Bell by \$120 million.

Final decisions from the PUC concerning 1988 rates and revenue are not expected until late April. □

## TRW readies TCP/IP line

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protocols, permitting the interconnection of networks with a combination of protocols, such as TCP/IP and Digital Equipment Corp.'s DECnet.

Six of the bridges work with IEEE 802.3 local networks housed in the same building, and five work with remote networks.

Connections to 10M bit/sec Ethernet, 1M bit/sec StarLAN and broadband modems are supported by the local bridges. All local bridges are priced at \$5,395.

The five remote bridges, ranging from \$5,495 to \$7,195, are also expected to be introduced. They support interconnection of remote 802.3 networks over T-1 lines, fiber and broadband cables operating at 2M, 5M, and 10M bit/sec.

TRW will offer three new network adapters for IBM Personal Computers and compatibles. Each adapter comes with TRW's OS Connection software, which provides TCP/IP capabilities, including the File Transfer Protocol, Telnet virtual terminal protocol and electronic mail. OS Connection was announced early last year, in conjunction with the ACU 2000 communications server.

The PC 2000 MSDOS adapter is designed for IBM Personal Computers, XT's, AT's and compatible systems running MS-DOS. The PC 2000 Z-100 adapter installs in Personal Computers with the Zenith Data Systems Z-100 bus system. The third adapter, the PC 2001 Xenix, can be installed in any IBM Personal Computer AT running IBM, Microsoft Corp. or The Santa Cruz Operation, Inc.'s Xenix.

Each type of adapter is available in two versions: an intelligent version, which includes an Intel Corp. 80186 microprocessor, and a nonintelligent version, which requires the Personal Computer's

processor to handle all protocol processing.

In addition, the MS-DOS and Z-100 adapters come with a Network Basic I/O System interface. This allows Personal Computers equipped with these adapters to access services provided by other network servers and workstations that support NETBIOS.

The intelligent adapters will be priced from \$595 to \$670, and the nonintelligent adapters will range from \$495 to \$670.

TRW is also planning to unveil a series of IBM Personal Computer-based network management products, including a packet monitor.

The NM 2000 network management system will provide management, control, monitoring and reporting capability for Ethernet-based local networks running TCP/IP. It will work with both TRW-manufactured devices and TRW-supported devices from third-party vendors.

The NM 2000 will be available in three configurations: an IBM Personal Computer AT-compatible system running Xenix; and two Motorola, Inc. 68020-based systems supplied by Sun Microsystems, Inc., which run Unix. A Sun Microsystems-based system will cost approximately \$20,000.

In conjunction with the NM 2000, TRW will also offer the LS 2000 LanStat, a packet monitor, and the LL 2000 LanLoader, for loading software into ACU 2000s. The LanStat supports several types of networks, including Ethernet and StarLAN. It can be used to collect statistics on a network segment, trace packets and generate test traffic.

When used in conjunction with the network management system, the LanStat can collect link, IP and TCP level statistics. It will be priced from \$1,995 to \$2,245, depending on the network media used.

The LanLoader is a Motorola

68000 microprocessor-based device designed to download new software or software updates into thousands of ACU 2000s on a networkwide basis. It will be priced from \$2,995 to \$3,245, depending on the network media.

The roll-out in January will involve only some of the products TRW expects to introduce in 1988, Martson said. TRW is hoping the new products and higher visibility will boost network sales, particularly among commercial users. Since entering the networking market three years ago as a systems integrator, TRW has been quietly winning multimillion dollar contracts, largely for military customers.

The company's largest contract to date is with the Air Force Logistics Command. This contract is currently netting TRW \$2 million a month. Earlier this year, the company won a \$3 million contract to install a network at the Air Force Institute of Technology at Wright-Patterson Air Force Base in Dayton, Ohio.

TRW has also targeted select vertical markets, including health care and finance, Martson said.

In contrast to personal computer local net vendors such as 3Com Corp. and Novell, Inc., TRW is building very large networks, with between 5,000 and 10,000 nodes, Martson said. TRW also says it differs from Ungermann-Bass, Inc. and Sytek, Inc. by offering true system integration.

"For systems integration, you have to link all elements of a hybrid network — multivendor hosts, multivendor workstations, and voice, data and video," Martson said. "We are the only true systems integrator in the business. We come through the door and do the cable survey, the cable plant. We're crossing operating systems, the boundaries between protocols and also the various transmission media." □

## NETWORK WORLD

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INTERNATIONAL NEWS

# ISDN has its debut in France

*Nationwide service expected by 1990.*

BY GERARD BIDAL AND LINDA LEWIS  
Le Monde Informatique, an IDG Communications French publication

SAINT BRIEUC, France — France last week launched its first commercial Integrated Services Digital Network service here.

With the project, dubbed Renan, the government hopes to give French industry a major stake in a nascent worldwide market that is expected to blossom into a multi-billion-dollar industry by the early 1990s.

By September 1988, ISDN service is expected to be extended to the Paris area and, during 1989, should expand to include the French cities of Rennes, Lille, Lyon and Marseille.

The first international connections are to be added in 1989. If all goes as planned ISDN service is expected to be available throughout France by 1990.

In coming weeks, France's state-owned Direction General des Telecommunications (DGT) will finish connecting some 300 users from the economically troubled Brittany region to the new service. Although, due to the network's geographical limitations, most of the early clients plan to use Renan for intracorporate communications (between a bank and its agencies, for example), several are already looking at intercompany data- and image-exchange applications.

Initially, a Basic Rate 2B+D Interface will be offered. It includes two bidirectional digital channels at 64K bit/sec, the so-called B channels; and a bidirectional 16K

bit/sec channel known as the D channel.

The B channels carry digital voice, data or image transmissions, while the D signaling channel is used for managing transmissions, although it may also carry low-volume supplementary services.

For the basic service, a one-time connect fee of about \$123 will be charged, along with a \$55 monthly subscription fee. For complementary business services, subscribers must pay an additional \$7.60 per month. Traffic will be charged at rates of between 34 cents per minute and \$1.14 per minute. The DGT expects rates to decrease as the service is extended throughout the country.

A Primary Rate Interface composed of 30 64K bit/sec B channels (vs. 23 B channels specified in the U.S. version of the standard) and one 16K bit/sec D channel will be offered in 1989. Serving high-volume applications, it will enable the interconnection of private branch exchanges and computers into intelligent networks. The DGT contract will include the provision of a small, digital network interface terminal.

## ISDN demand to grow

According to a European study published last year by International Data Corp., demand for national ISDN services will start to grow rapidly in the early 1990s. The UK and France are expected to complete nationwide service first, while Switzerland and Italy should follow in 1992 or 1993. British Telecommunications plc's pilot trial in the UK reportedly involves 38 large company customers using 90 ISDN lines, with orders for 80 more.

West Germany, although currently operating pilot trials in Mannheim and Stuttgart, is expected to offer nationwide ISDN services by 1995. The West German project, which is in its fifth trial phase, calls for the installation of eight local and toll exchanges by the end of 1988. German authorities expect three million ISDN subscribers by 1995. □

# Airlines join in network subsidiary

continued from page 3

the company needed flexibility. "When we were part of TWA, we had to cost-justify all of our lines before purchasing them," Livingston said.

"As a service company, we need the extra capacity to sign up new customers," he said. "Customers won't wait nine or 10 months for a line to be installed."

Once the T-1 network is finished, PARS plans to sell extra network capacity to travel industry companies. This strategy is similar to that of Texas Air Corp., parent of Continental Airlines Corp. and Eastern Air Lines, Inc. Texas Air resells capacity on its nationwide T-3, 45M bit/sec backbone network (see related story this page).

PARS is also looking to develop and sell new communications products. "We are very interested in

developing a communications processor," Lewis said. "Customers, such as travel agents, need a device that will connect them to different networks, regardless of their communications protocols." Lewis said PARS is currently talking with a number of communications processor suppliers about jointly designing the product.

Livingston said the current beehive of activity is typical for PARS and other airlines. "In every interview, I tell a potential employee that there are two bad points to working here," Livingston said. "First, there is a lot of frustration because the only customers you talk with are the ones with problems. Second, there is a lot of pressure. If you can't deal with frustration or take pressure, this is not the place for you to work." □

USER AS VENDOR

# System One leases private net bandwidth

BY JOSH GONZE  
Senior Writer

CHICAGO — System One Corp. recently signed a contract to lease capacity on the private network it operates for parent company Texas Air Corp. to Compu-Tel Systems Group, its first paying customer.

Under the agreement, in 1988, Compu-Tel will lease and resell bandwidth on System One's network in four cities: Chicago, Miami, Atlanta and Los Angeles. In 1989, Compu-Tel expects to resell System One network capacity in 40 additional cities, according to Patrick Golden, Compu-Tel's president.

System One is the telecommunications subsidiary of Texas Air, providing reservation network and other communications services to the company's airline subsidiaries. The company serves Eastern Air Lines, Inc., Continental Airlines Corp. and 20 other airlines, as well as a variety of travel service companies such as rental car agencies.

The company was created in the summer of 1987 to market excess capacity on the network ("Texas Air building gigantic SNA net," NW, Aug. 3), which is a national network of fiber-optic circuits managed from a control center in Houston.

The network includes T-1 and T-3 links leased from Lightnet and Williams Telecommunications Co., according to Golden.

System One intends to sell both private network and X.25 packet-switching services in the future, according to spokeswoman Charlotte Kirk.

Customers of System One's network will include private industry as well as commercial buyers, such as Compu-Tel, that intend to resell capacity.

Compu-Tel's primary business is installing building cabling systems. The network capacity it leases from System One will enable the company to sell transmission services to a wide range of buyers, Golden said. □



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IBM* "Category B" Devices††	"Yellow Balun" NH12460*	NH12569*	0205TA	1206TA	NONE REQUIRED
IBM* System 36	"Green Balun" NH12540	NH12565	0317TT	131BTT	2301TT
IBM* Token Ring Network	NONE REQUIRED	NH12438 (Type 3 Media Filter)	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE
WANG* VS. OIS	NH12456*	NH12477	NOT RECOMMENDED	NONE REQUIRED	NOT RECOMMENDED
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# LAN controls air traffic

continued from page 1

tion System Center, based here.

With the new system, developed on networked workstations from Apollo Computer, Inc., FAA traffic managers can view a map of the U.S. and see where aircraft are located. Traffic managers can also view selected cuts of data, such as all flights with the same destination, route or altitude.

Specific geographic areas and airway segments can also be viewed, according to Bud Medeiros, chief of the Automated Applications Division of the Transportation System Center.

The prototype system is designed to help traffic managers at FAA headquarters in Washington, D.C. do strategic and tactical planning of air traffic, Medeiros said. He estimated that 3,000 airplanes a day are under the FAA's control. More timely information could help the FAA more efficiently re-route and reschedule flights in case of a major storm, for example. This could cut down on delays.

Recently, the DOT signed a contract with Apollo for an additional \$2.6 million worth of computer and network equipment, which will be used to expand the prototype system. Apollo offers a proprietary 12M bit/sec token-passing network and uses a distributed operating system on its workstations. This allows users and programs to view the network as a whole.

Under the contract, the DOT will purchase more than 50 computers, ranging from entry-level personal workstations to high-performance graphics workstations.

The expanded prototype is an interim step toward full implementation of an advanced air traffic management system, expected to be in place by 1995.

The prototype tracking system takes advantage of the distributed nature of the Apollo network, which allows any network node to communicate with and start up tasks on any other node, Medeiros said. "I think it's a unique application — it could not have been done on a mainframe," he said.

The system uses data that was already being collected from 20 regional Air Traffic Control Centers, and transmitted via dedicated 56K bit/sec lines to an FAA technical center in New Jersey. The Transportation System Center in Cambridge collects the same data on flight plans from the technical center using dedicated lines.

Two Apollo computers act as gateways to the Transportation System Center network; these machines ship the data via the local network to a flight table manager. From this memory-based table, information is then handed off to a series of Apollo computers that perform various operations, such as processing aircraft route information. One computer on the network is responsible for comparing actual use of airspace and airport facilities against ideal usage figures and generating alerts.

Once the data is processed on

the system in Cambridge, it is sent to the FAA in Washington via dedicated 56K bit/sec lines. A satellite link is also being set up to provide redundancy, Medeiros said. "We were able to tap the data in real time, process it and generate timely outputs. This will help balance the flow of traffic," Medeiros said.

The prototype system is being implemented to provide improved tracking capabilities now while the specification of the entire advanced air traffic management system continues, Medeiros said. This comprehensive system will include information on all commercial and military use of air space in the U.S. The specification is due to be completed in 1992, with implementation slated for 1995. **■**

# Users puzzled by 9751

continued from page 2

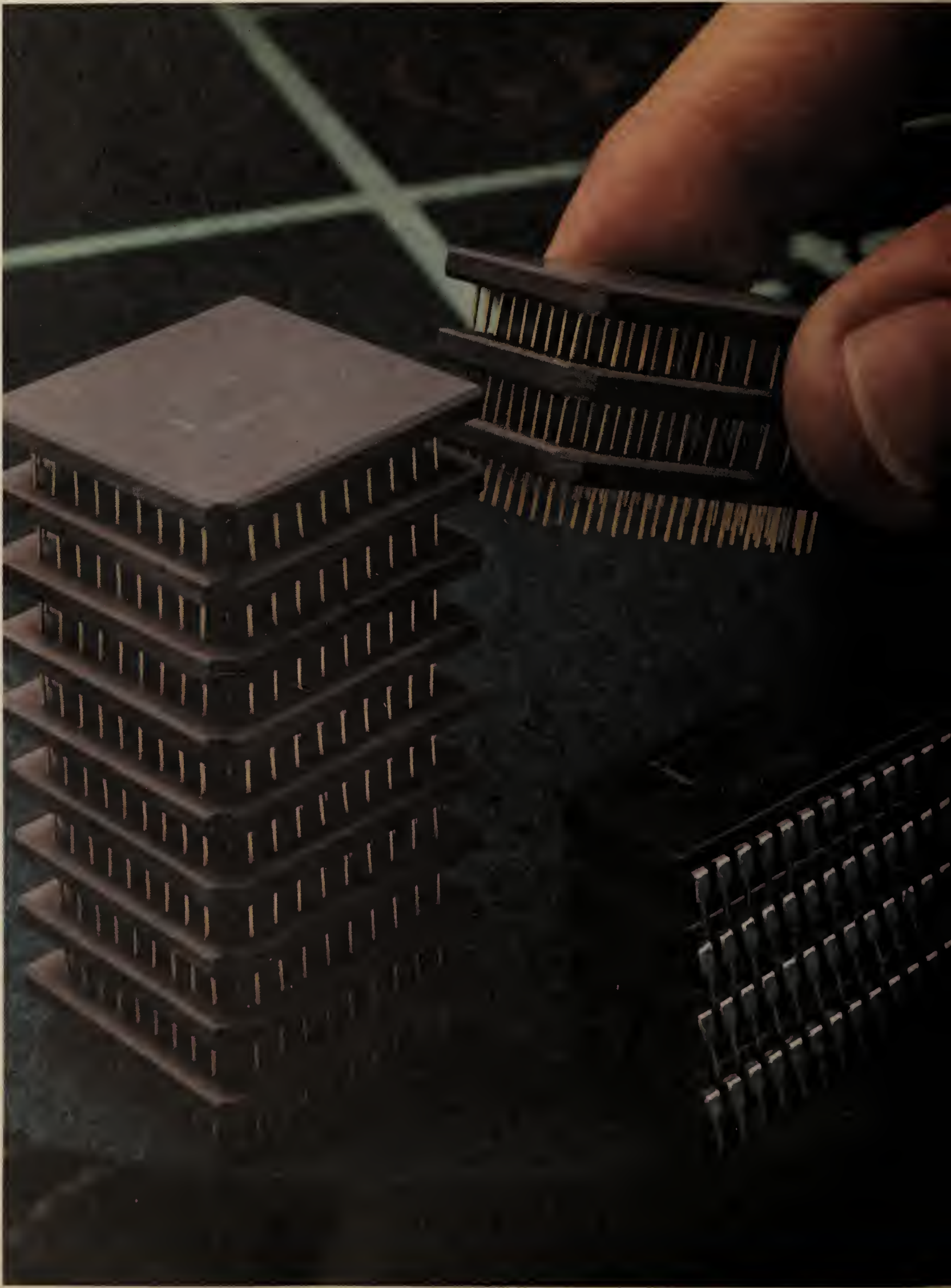
they've done that yet. I think, at this point, they've simply explained they've got a new architecture. They haven't translated that into benefits a user can expect to gain from installing one," Monahan said.

The 9751 features a call-processing architecture that differs from Rolm CBX II switches. While users have been widely quoted in the trade press as wondering whether the architectural changes make Rolm systems incompatible with the 9751, 68% of those surveyed said they were not concerned about the incompatibility issue.

Monahan said the survey showed that users believe there is enough compatibility between the switches to enable them at least to link a 9751 into an existing network of CBX IIs.

In the survey, the managers were asked 13 simple questions that did not attempt to go beyond first impressions of the product. "We were really interested in first impressions because I think they tell a lot about how people in the marketplace react," Monahan said.

Because the survey was not more probing, Monahan said, "You can say a lot of the people who said they don't understand the





9751 may not have paid attention to it because they don't own Rolm equipment."

Although the survey did not ask managers what size telephone systems they oversee, Monahan said, most of the 250 managers questioned are responsible for telephone systems of 800 lines or more.

The survey also shows Rolm a step below Northern Telecom, Inc. in the eyes of nearly half of the telecommunications managers. Managers taking part in the survey ranked Northern Telecom ahead of Rolm and AT&T as the premier switch supplier.

"It was interesting that, with 55% of the people owning Rolm systems, Northern Telecom was

rated as the No. 1 vendor of choice among those people," Monahan said. Northern Telecom was ranked first by 46% of the managers, with Rolm being named first by 34%. AT&T was ranked first by 20%.

AT&T's third-place finish did not surprise Monahan. "People who have Rolm or Northern Telecom switches are very dedicated to them. People with AT&T switches haven't displayed that type of loyalty," he said.

"One of the things Rolm had was strong customer loyalty. It shocked me that people who had Rolm systems would end up rating Northern Telecom ahead of Rolm. People who had Rolm systems were really very, very loyal to that product.

They felt the sun rose and set on it. Some of that is evaporating at this point."

In a pair of background questions not related to the 9751, 51% of the managers said they use their PBXs to switch data. In addition, 43% of the managers not currently switching data said they are planning to implement it within the next year.

Despite those findings, Monahan said he does not feel data switching on a PBX will become the networking scheme of choice. "My perception in working with end users is that data switching through a PBX hasn't caught on. People haven't gone out in droves and made this the network of choice," he said. ■

## ► GEORGIA-PACIFIC

# Net lets firm cull key data

*Network keeps user on top of trends.*

BY MICHAEL FAHEY

Senior Writer

ATLANTA — Georgia-Pacific Corp. is improving its ability to collect key market information by upgrading the network that links its corporate headquarters here with more than 150 sales outlets across the country.

The network upgrade project, which began in June 1986 and will be completed early this year, calls for the installation of IBM System/36 minicomputers in each of the company's wholesale distribution centers, which supply retail lumber yards and home supply centers with building products. The minicomputers will be linked to the corporate IBM 4381 mainframe, outfitted with an IBM 3725 front-end processor, using 24 multidrop AT&T private lines operating at 9.6K bit/sec.

The new net will further the company's goal of being "market-driven rather than marketing-driven," said Sam Gaddis, national director of marketing and sales.

The network will be used to feed sales and inventory data to the headquarters and will support on-line credit authorizations.

The new system is replacing a network based on Digital Equipment Corp. gear and will provide two-way communications between the branches and headquarters. With the older network, distribution centers were polled nightly for sales information, but Georgia-Pacific could not send information from the data center to the distribution centers. DEC equipment in the network included DECmate microcomputers.

"The older network was more an inventory tool than a marketing and sales tool," said Ken Bettis, controller of distribution branch operations, who headed up the installation of the IBM equipment.

The new network will further the company's goal of being "market-driven rather than marketing-driven," according to Sam Gaddis, national director of marketing and sales for Georgia-Pacific's building products division.

Building products accounted for two-thirds of Georgia-Pacific's \$7.2 billion in total revenue in 1986 and nearly three-quarters of corporate profits.

In addition to changing the hardware that serves the distribution centers, Georgia-Pacific has

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## Three years ago Intel was so excited about ISDN, they bet their chips on it.

In 1984, the technology for ISDN wasn't yet available. And Intel's customer application of ISDN, through Mountain Bell—a US WEST Company—and AT&T Network Systems, wasn't even slated to begin until February, 1987.

But one of the world's leading microchip manufacturers saw the potential of ISDN to link its offices in California, Oregon and Arizona at higher levels and economies of integration. To handle data traffic from a variety of networks and computers at each site.

So Intel, which already supported ISDN as an industry standard with a special set of semiconductor chips, decided to emulate ISDN on its existing networks, and made an early corporate commitment to migrate towards ISDN.

Today, that commitment is paying off. In field trials, Intel has been sending voice and data simultaneously over ordinary Mountain Bell telephone lines using the AT&T 5ESS™ digital switch to support PC networking and provide fast file transfer between the company's ETHERNET local area networks.

"Combining the bulk of our voice and data traffic on the same twisted pair wiring will save us considerable money because we do not need to run coax cable through the plenums, buildings and corridors," said Don Melvin, Intel corporate telecommunications manager.

"The ISDN network we're building today will allow us to integrate voice and data, not only in our T1 network, but also in our digital switches right to the desk, and extend switched data routes to the computer host," he added.

"We need to have the global digital connectivity end-to-end which ISDN brings us, and we want to be able to make use of its shared bandwidth on demand without having to do manual patching."

As we did for chipmaker Intel, AT&T and your telephone company can help your business cash in on the networking and cost efficiencies of ISDN.

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# N.E. Tel readies net

continued from page 1

retaining private network-like benefits, such as the ability to support corporate dialing plans. Conversely, V Path will eventually let customers tie smaller sites to private networks that otherwise do not generate the traffic to justify leased-line access.

"A potential V Path customer would most likely have some type of existing private-line-based network and would be looking for some price stability over the next few years," Duffy said. He said a few financial institutions with branches throughout eastern Massachusetts are interested in V Path.

Although intended to be used predominantly for voice, the service will also be pitched to large users with existing intra-LATA private-line networks that also support data. V Path's data-handling capabilities will be limited to a speed of 9.6K bit/sec, the typical level of service currently supported on the analog public-switched network.

In its V Path tariff, New England Telephone proposed offering the service on a feature-based payment basis. That payment plan would enable the company to draw up contracts calling for customized networks and pricing for each customer. Each of those contracts would require DPU approval.

Although V Path pricing will be based on individual user contracts, analysts said customers with private lines supporting locations that do not have the traffic volume to justify high private-line charges can expect to gain a price advantage by using V Path.

Analysts said other BOCs will follow New England Telephone's lead. "It's not as if New England Telephone is thundering across the finish line by 18 lengths," said Robert Ellis,

president of Rockville, Md.-based The Aries Group, Inc. "The other guys are hard on their heels. This filing is likely to prompt other BOCs to offer virtual private networks."

In fact, New York Telephone Co., sister company of New England Telephone under Nynex Corp., is expected to file a virtual network tariff for New York City in the first quarter of 1988, a New York Telephone spokeswoman said.

BOCs owned by Bell South Corp., Pacific Telesis Group and Bell Atlantic Corp. are also expected to file for virtual networks soon, Ellis said. Operating companies within Ameritech, US West, Inc. and Southwestern Bell Corp. are lagging behind.

Analysts also said that the advent of regional virtual network services would not have a bearing on similar services offered by the long-haul carriers.

Users will not want to supplant national services with a myriad of regional virtual networks linked by switched long-distance lines, said Joaquin Gonzalez, director of enterprise network strategies for Gartner Group, Inc., a Stamford, Conn.-based consulting firm.

"Each of the BOCs will likely offer different features under different terms and conditions with different pricing schedules," Gonzalez said. "If you're the manager of a nationally deployed network, you're going to have a tough time with that."

While the initial V Path offering will strictly support intra-LATA calling, Duffy said, New England Telephone plans to include interfaces that would enable switched V Path calls to be routed to existing private-line networks and to virtual network services from long-haul carriers.

Any intra-LATA V Path traffic destined for private-line or other virtual networks outside the LATA would be handed off to customer-selected interexchange carriers, Duffy said.

By providing a link to other virtual network services, V Path could be used to replace dedicated and WATS lines that customers use to access AT&T's Software-Defined Network service, MCI Communications Corp.'s VNET or US Sprint Communications Co.'s Virtual Private Network service.

Links to existing high-volume private lines could make V Path even more cost-beneficial to intra-LATA users. "Enabling switched virtual network calls to interface to existing private-line networks allows a company to have switched service economies at low-volume locations while keeping T-1 economies in high-volume locations," Ellis said.

"That type of combination makes the network a little less manageable," he said. But it also enables users to capture the cost savings offered by both options.

Before New England Telephone can extend V Path services to other LATAs, Gartner Group's Gonzalez said, the issue of whether SS7 data channel transmissions will be able to cross LATA boundaries must be resolved. If that restriction is not eventually waived, the BOCs will have to establish a virtual network data base in each LATA they want to serve.

Gonzalez also said that, if BOCs can agree to offer virtual network services that can be easily blended, they could sell those services to a third party capable of building a network to route traffic between LATAs. By doing that, the BOCs could compete against AT&T, MCI and US Sprint for nationwide virtual network customers.

V Path employs an out-of-band signaling network, which uses the SS7 protocols, to route customer-dialed V Path calls via signal transfer points to a computer data base.

That data base will validate the caller's V Path calling privileges and translate the dialed V Path number to a switched network number. That switched network number is routed via signal transfer points back to the switch serving the caller. The switch will then route the call to its destination within the LATA. □

# Firm forms net subsidiary

continued from page 1

tor of Enterprise Network Strategies at Gartner Group, Inc. in Stamford, Conn. "We should see improvements in service and lower prices as a result."

Teleport Communications, founded in 1985, provides alternative private-line services to customers in New York on a 150-mile fiber-optic network that spans the city and runs into northern New Jersey.

MLTTI plans to form new companies or enter into joint ventures with existing alternative carriers in cities that are traditional business centers with heavy communications requirements. Possible sites include San Francisco, Los Angeles, Houston, Chicago, Washington, Philadelphia and Boston.

MLTTI will provide financing, technical and managerial support to the new companies, which will operate under the name of Teleport Communications Group. Each metropolitan company will be an independent company with its own general manager and local staff, Atkinson said.

The new companies will use various transmission technologies, including fiber optics, microwave and coaxial cable, depending on the particular needs and conditions of each market, Atkinson said.

The Teleport companies will require authorization from the state public utility commissions, which regulate local carriers and intrastate telephone service.

The states have the authority to allow competition in local telecommunications markets, which have historically been dominated by regulated monopolies.

Teleport Communications was the first company granted permission by the New York Department of Public Service to provide local telecommunications services in competition with New York Telephone Co., the local Bell operating company in New York.

Industry analyst Robert Ellis, president of The Aries Group, Inc. in Rockville, Md., said this type of venture is capital-intensive, but added, "Merrill Lynch certainly has the financial resources to succeed."

Ellis also said that the successful New York venture is a good sign of the company's potential. "Customers want to know that a company they're doing business with is well-financed and will be around in 10 years." □

Atkinson said Teleport has been successful in attracting large customers in New York because, "We've been able to offer high-quality service and price stability. We are the Cadillac of high-capacity T-1 service," he said. "We offer long-term contracts and volume discounts, which are important to customers making long-range plans."

"There's been a great deal of volatility in RBHC private-line rates since divestiture that has been terrible for users. We hope competition will help stabilize prices," Atkinson said.

New York Telephone has been competing with Teleport since 1985, said company spokesman David Bradley. "Teleport has been an active and aggressive competitor. Competition in the local exchange has been good not only for users but for us as well," he said.

"Competition has made pricing, service quality and installation times much more crucial issues. Competition has forced us to improve in these three areas, and we've benefited from that," Bradley said.

MLTTI is looking at the possibility of forming joint ventures with local bypass carriers that have already started doing business in Washington, Chicago and Philadelphia.

The primary alternative service providers are Institutional Communications Corp. (ICC) and the Washington International Teleport Co., both of McLean, Va.; the Chicago Fiber Optics Corp.; and Philadelphia-based Fiber Optics Corp. of the U.S. (FOCUS).

"There are only a half-dozen cities that have the volume of traffic to support more than one carrier," said Bruce Kirschenbaum, president of the Washington International Teleport. "I think it would make sense for Merrill Lynch to expand into Philadelphia and Washington. I wouldn't be surprised if they form an alliance with FOCUS and/or ICC."

When asked if the Washington International Teleport would be a likely partner for Merrill Lynch, Kirschenbaum said no, because the Teleport is in the video transmission business. Merrill Lynch and ICC are in the data market.

Merrill Lynch has appointed Robert Annunziata president and Douglas Beardsley vice-president and general manager of MLTTI. □

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# INDUSTRY UPDATE

## INDUSTRY EYE

PAM POWERS

### Gift ideas for the naughty and nice

**A**rguably, everyone deserves a measure of good luck for the new year, and vendors in the communications industry are no exception. *Network World* has heard the numerous wishes of that lot and, having deemed that they, as a whole, were more nice than naughty in 1987, has drawn up a list of presents to be dispensed among those that kept us communicating this year.

In magnanimous holiday spirit, we included all types on the list — the rich, the poor and even the misfits of the industry. With these gifts, the companies on the list will be assured a prosperous New Year.

**AT&T.** In a miraculous epiphany, customers suddenly realize that AT&T's computers really are the perfect complement to the company's long-distance services.

**IBM.** Big Blue's fairy godmother gives the company a fresh start by suddenly making all IBM systems compatible.

**US Sprint Communications Co.** Under the tree will be the largest, most sophisticated billing system ever built. This system can be simply plugged into a wall jack, at which time it will dutifully churn out up-to-the-minute records of customer accounts, detailed and impeccable bills, and robot thugs that will track down the deadbeats and hang them by their thumbs. All that, free.

**MCI Communications Corp.** AT&T will decide that the long-distance business isn't part of its core strategy.

**Communications Satellite Corp.** Sharks will develop an insatiable appetite for transatlantic fiber-optic cable. And the Federal Communications Commission, suddenly seized with the Christmas spirit, will say "never mind" about the \$38.8 million COMSAT has been ordered to repay after earning more than its allowable rate of return.

**Contel Corp.** Charlton Heston will be as capable of convincing customers to part with money as he was with parting the Red Sea.

**The regional Bell holding companies.** U.S. District Court Judge Harold Greene wakes up one morning in a sympathetic frame of mind, deciding that all that talk about potential anticompetitive abuses by the RBHCs is poppycock. Greene then asks if it wouldn't be best for everyone if those poor, harassed RBHCs could provide long-distance and information services as well as manufacture equipment.

**StrataCom, Inc.** A sugar daddy.

**Tymnet, McDonnell Douglas Systems Co. and Telenet Communications Corp.** An extended vacation on a quiet island — good treatment for hypertension. These guys got hit from both ends of the business this year. Judging by disappointing sales

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## Sytek signs pact with medical supplier

Sytek, Inc. signed a multimillion dollar reseller agreement with Medical Systems Support, Inc., a supplier of computers to the health care industry. Medical Systems Support will sell Sytek's broadband local-area networks to hospitals for simultaneous transmission of voice, data and video.

## MUX MANEUVERS

### Infotron stays single in a merging market

*CEO James Castle opts for strategic alliances.*

BY PAM POWERS

Senior Editor

CHERRY HILL, N.J. — Infotron Systems Corp. can ring in the new year with a return to profitability, but the company still faces an uphill struggle to succeed as an independent company against competitors that are merging.

James Castle, who was appointed Infotron chief executive officer two months ago, said his company will compete against other T-1 multiplexer makers by forming alliances with other vendors, but he said Infotron has no interest in becoming acquired. Infotron sells statistical and T-1 multiplexers, network management systems and matrix switches.

But analysts cautioned that Infotron may need a suitor to wrest market share from larger players in the T-1 market, where it has already lost momentum due to the tardy entry of its T-1 product.

Like competitors Timeplex, Inc. and General

See page 10



James Castle

## LITIGATION

### MCI hit with another suit

BY MARY PETROSKY

Senior Correspondent, West Coast

WASHINGTON, D.C. — Long Distance Service of Washington, D.C. recently filed suit against MCI Communications Corp. for alleged disruption of its business, becoming the fourth long-distance reseller to take such action against MCI.

The suit, filed in a U.S. District Court here on Nov. 24, alleges that transmission service provided to Long Distance by Satellite Business Systems (SBS) began to deteriorate shortly after MCI's acquisition of SBS. Long Distance is seeking \$12 million in damages.

MCI acquired SBS in March 1986 from IBM. The SBS network provides leased transmission services to eight long-distance resellers around the country.

According to published reports, MCI acquired the SBS network in order to upgrade its own long-distance transmission equipment. As part of the SBS acquisition,

IBM received 16.6% of MCI's common stock.

In its suit, Long Distance alleges that MCI refused to process several telephone numbers requested by the company, claiming the numbers belonged to MCI customers; that MCI sent bills and letters to Long Distance customers, even though the customers had not selected MCI for service; and that MCI delayed and interrupted Long Distance customers' attempts to dial direct via equal access.

According to a spokesman for Long Distance, the company lost at least 20 major customers because of the inability to dial direct.

Long Distance's claims are similar to those of Biz-Tel, a West Palm Beach, Fla.-based long-distance reseller. The Biz-Tel suit, filed last March, seeks \$8 million in damages against MCI. Two other suits that sought injunctions to prevent MCI from severing resellers' contracts were settled out of court in November 1986. ▢

## BRIEFS

**TIE/communications, Inc.** of Shelton, Conn., begins the new year with two new subsidiaries. **ABI American Business-phones, Inc.**, which sells, installs and maintains telephone and telecommunica-

tions equipment for commercial customers, will become a wholly owned subsidiary of TIE. The merger is subject to approval by ABI's stockholders, who will vote on the transaction at a meeting to

be held in March or April.

TIE also acquired **Honeywell, Inc.**'s small-systems communications services business. Honeywell sold the business — which sells, installs and services

See Briefs page 10



# Infotron stays single in market

continued from page 9

DataComm, Inc., Infotron has evolved its product line from statistical multiplexers to high-end T-1 networking multiplexers and network management systems. This year, the company introduced new products for both markets, which have sold according to plan, according to Castle.

"We lead the pack in network management, and this new system has been extremely well received," Castle said. "In fact, we expect to expand our research and development expenditures in that area."

Infotron has been shipping the NX 4600 T-1 multiplexer line since March. Castle said sales have met company expectations, although statistical multiplexers still make up the bulk of Infotron's sales. Most early orders for the new T-1 product have come from Europe, Castle said, but he said he expects that line to contribute an increasingly larger portion of Infotron's domestic sales in 1988.

If analysts' observations are correct, Infotron's future success may rest heavily on its ability to sell the NX 4600 product line, and the company is already working under a self-induced handicap. "Infotron is living with the sin of not recognizing the T-1 market in time," said Richard Villars, a senior analyst with Framingham, Mass.-based International Data Corp. "They were late in introducing a T-1 product."

In addition, Villars said, Infotron's primary source of revenue, its statistical multiplexer business, is experiencing slow growth due to declining demand. Consequently, products such as the NX 4600 will have to pick up the slack.

Infotron's balance sheet reflects troubled times in the statistical multiplexer market. In 1986, the company posted a loss of \$2.3 million on revenue of \$81 million. The company orchestrated a return to profitability of \$168,000 on revenue of \$20.5 million in the second quarter ended June 30 of this year, and Castle predicted continued profitability in 1988.

Reversing the downward trend in earnings required, and will continue to require, changes in the way Infotron does business. Castle said several of those changes, including a corporatewide layoff and other cost-cutting measures, occurred prior to his arrival, under

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"We have absolutely no interest in being purchased by anyone," said Infotron CEO James Castle.

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the direction of former CEO James Hahn.

One change Castle said he will effect involves meeting product delivery. "In the past, we've missed product shipment dates. Now we are recommitting to our product development schedule to ensure that we'll do what we say we'll do on time," Castle said. "Frankly, I don't expect our [customers] to believe we'll do that until they have seen it happen."

Infotron also suffers from weak sales in certain geographical areas. Castle said the company consistently overachieves sales targets on the East Coast and in central regions of the U.S., while sales are poor in other areas. "I'm seeing to it that we achieve high-level systems sales everywhere," he said.

While Infotron has had difficulties with product shipments and sales strategies, Castle said, the company is exceptionally strong in product development and customer service. "Before taking this job, I spoke with Infotron customers and found they were quite pleased with the service."

Jeremy Frank, a program director for Gartner Group, Inc. in Stamford, Conn., confirmed that Infotron has a solid product line. "Its strength is in a good network management system that is integrated with its T-1 multiplexer."

Regardless of its internal strengths, some charge that an independent Infotron will have trouble maintaining a toehold in a market that is swiftly becoming populated with giant players. Un-

isys Corp. recently bought Timeplex, IBM has an arrangement with Network Equipment Technologies, Inc. (NET) and Digital Communications Associates, Inc. bought Cohesive Network Corp. last year.

But Castle is adamant. "We have absolutely no interest in being purchased by anyone," he said, adding that he has had several offers for alignments of different types. He acknowledged, however, that the current market consolidation has forced him to examine its effects on Infotron more closely.

"This is, by nature, an interconnect business that requires us to work with different vendors' equipment. We might have an advantage as an independent firm over companies that have motives for selling one type of equipment

over another," Castle observed.

Also, Castle said, acquisitions seldom achieve the intended results. "These are large companies acquiring small, fleet-of-foot companies. I expect that, in some cases, the smaller companies will no longer be attractive places to work for creative people. We would be the beneficiaries in that case."

Castle conceded that competitors may gain access to the coffers of large corporations, providing them with considerably more capital than Infotron would have. "That could mean they would advance their products faster than we would," he said.

Frank said Infotron's weakness is its independence. "They are up against Cohesive, NET, Timeplex and StrataCom, [Inc.,] most of which have good solid partners. I don't know if anybody will be able to pierce the big four. The T-1 market just isn't that big." He added that Infotron is a candidate for takeover because of its strong product line and low stock price.

Castle said Infotron will be able to keep its independent status. But in order to provide a wider range of products and gain access to the installed base of other vendors, he said, he hopes to cultivate a number of joint marketing agreements in lieu of a direct acquisition.

"We need to sell complete solutions, and, since we're unable to manufacture everything, it's important that we strike up strategic alliances," Castle said he hopes to align with larger vendors, which could resell Infotron products to their installed base, and with other communications vendors that could provide Infotron with the components it should have to round out its product line. □

## Briefs from page 9

key telephone systems and small private branch exchanges — because stand-alone small telecommunications systems do not complement the company's business strategy, according to Honeywell.

**Western Union Corp.** filed counterclaims against **Citicorp Services, Inc., Citicorp, Citibank, N.A. and American Consulting Corp.** that seek damages of at least \$1 billion. Last month, Citicorp Services initiated an antitrust action against Western Union and the operation of its money transfer service.

In its counterclaims, Western Union alleges that Citicorp and American Consulting conspired, without success, to replace Western Union in the money transfer business by pressuring Western Union to sell its money transfer service to Citicorp at an unreasonably low price.

Further, Western Union charges that Citicorp used Western Union agents to divert Western Union customers to Citicorp and engaged in baseless litigation to subvert Western Union's pending restructuring.

**General Telephone Co. of Cali-**

**fornia** recently announced a plan for further reducing its work force.

An agreement with the **Communications Workers of America (CWA)** offers a choice of severance plans to about 3,000 hourly employees who work in selected job categories, such as production assembly and equipment installation. The plans, which are part of the CWA contract with GTE California, provide for termination pay, retraining, and extended health and dental benefits.

The company is also reducing the size of its management staff and plans to announce an incentive program next month.

GTE California said it needs to reduce its union work force by 720 employees in 1988. Response to the plan will determine whether layoffs will be necessary.

**3Com Corp.** reported record sales of \$58.2 million for its second fiscal 1987 quarter, ended Nov. 30.

Net income of \$3.1 million included a one-time charge of \$3.2 million for costs associated with the company's merger with **Bridge Communications, Inc.** in September.

The company also reported record orders of \$64.9 million, a 69%

increase over the \$38.4 million recorded in the second quarter of fiscal 1986.

Sales for the six-month period were \$109.1 million, 62% above the \$67.5 million posted for the same period in fiscal 1986.

Year-to-date net income was \$8.6 million, or 30 cents per share, vs. \$6.9 million, or 27 cents per share, last year.

The state of California awarded **Centel Communications Systems** a \$4.6 million contract to design and install an integrated voice/data network for **California State University at Los Angeles**.

The network will include a Northern Telecom, Inc. Meridian SL-1XT for voice switching, an Infotron Systems Corp. INX4400 data switch for low- and medium-speed data transmission, a Proteon, Inc. ProNET-10 local-area network that will serve as a high-speed data backbone network and a Digital Equipment Corp. Micro VAX II computer with network management software.

Work on the project began in December and is scheduled for completion in August. Centel Communications Systems was also awarded a \$1.6 million, 10-year maintenance contract. □

## Gifts for the naughty and nice

continued from page 9

figures, private packet nets seemed to be persona non grata in 1987. And the FCC is trying to wallop public data nets with hefty access charges.

**Vendors of ISDN.** Worth its weight in gold, an ISDN bible containing useful applications for the standard that everyone is trying to sell and no one knows what to do with.

**Avanti Communications Corp.** Some respect.

**Western Union Corp.** A few new monikers from the press. The company must be weary of seeing itself referred to by various depressing, albeit accurate, appellations: for example, the debt-ridden, loss-plagued, once-dominant, ailing Western Union.

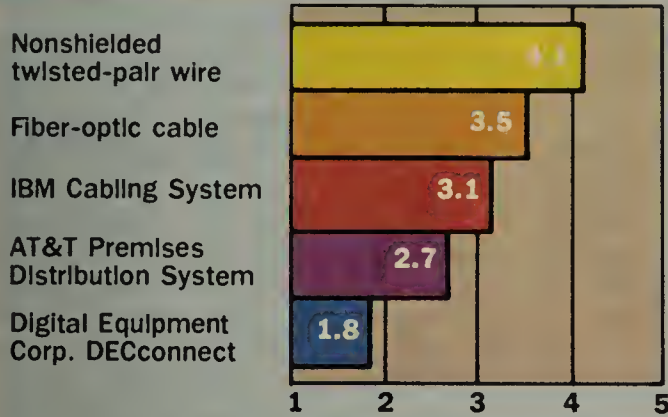
**Digital Communications Associates, Inc.** Ungermann-Bass, Inc. At least, that's what DCA wants. We're just not sure why.

**Ungermann-Bass:** Higher stock prices. □



# TELECOM TRENDS

## Users prefer hybrid to proprietary cabling schemes



Based on a scale of 1 to 5. A rating of 1 means the scheme will not be used; a rating of 5 means it will become a company standard. Thirty-one top users were interviewed.

SOURCE: FORRESTER RESEARCH, INC., CAMBRIDGE, MASS.

## STATEWIDE NETWORK

# Arizona awards \$8m PBX pact

*Centel wins switch deal.*

BY JOSH GONZE  
Senior Writer

PHOENIX — Taking a major step toward construction of a statewide private network, the state of Arizona recently awarded an \$8 million contract to Centel Communications Systems for two Northern Telecom, Inc. private branch exchanges.

One of the switches, a 12,000-line SL-100, will be installed in the state capitol building here to serve as the hub of a network supporting some 50 Arizona state agencies. The second switch, an 800-line SL-1XT, will be housed in Tucson, the state's second largest city.

Arizona plans to use T-1 circuits or microwave facilities to connect the new PBXs with switches already owned by the state. A request for proposal currently circulating is gathering bids for T-1 facilities. If a satisfactory bid is not found, an additional RFP for microwave equipment will be circulated.

The state already owns at least eight Northern Telecom SL-1s, each serving a particular branch of state government, said Larry Beauchamp, communications director for the state's Department of Administration.

The SL-100 to be located here will have a distributed architecture, with six remote switch modules attached. Three of those modules will also be located here and attached with fiber-optic cable, while the other three will be installed at state offices in three other cities and linked with T-1 circuits. Installation and cutover are scheduled for fall 1988.

Arizona gained industry attention in July 1987 when, following an AT&T rate filing that would have raised private-line costs by 90%, the state came up with a plan to dump its network of AT&T leased lines and Centrex services in favor of a private network. At the time, two studies commissioned by the state found that Arizona would save \$25 million to \$30 million over a 10-year period if it implemented a digital

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## PBX purchase survey

A survey on private branch exchange financing released recently by The Market Information Center, Inc. in Marlborough, Mass., showed that 57% of the 500 large user companies surveyed purchased their switches outright from the vendor.

Twenty percent of companies reported that they leased their PBXs from the manufacturer. Another 21% said they leased their switches from a third-party leasing agent. Only 2% of the respondents said they rented PBXs.

## TELECOM STRATEGIES

# Users exchange private lines for SDN service

*Firms use software-defined nets to supplement ETNs.*

BY BOB WALLACE  
Senior Editor

The rising cost of private lines and a steady decline in virtual private network service rates have prompted several users to replace portions of dedicated voice nets with software-defined network service.

Avant-garde users such as Primerica Corp., Unisys Corp. and Weyerhaeuser Information Systems are building hybrid voice networks by using software-defined network services to supplement electronic tandem networks (ETN).

Private lines are used in backbone ETN networks to link sites with heavy traffic requirements, and virtual private net services are used

to tie in smaller, geographically dispersed locations. The virtual net services extend private network-like features, such as uniform dialing plans, to all sites.

Virtual private network services are provided by programming call-routing data into the memories of long-distance carriers' switches. Although the network offers most of the functionality of a private network, service is provided over the switched network. Links are established only as needed.

Primerica, based in Hartford, Conn., once operated a four-node ETN serving 105 locations. Rising private-line costs and the sale of part of the corporation's business forced the company

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## CROSS TALK

BOB WALLACE

# Making time for planning

In the past year, many telecommunications managers were forced to focus on the daily operation of their companies' communications networks and place projects that could have given them a competitive edge on the back burner. Many, in trying to keep up with changes in the industry, had to give short shrift to strategic planning.

These managers were forced to devote their attention to restructuring within their own companies. Some even had to find ways to expand corporate networks to handle new companies gobbled up by their own firms.

Consolidation of communications service and equipment vendors and changes of course in vendor product strategies also demanded the attention of managers.

As a result, instead of creating applications that, for example, would draw on the combined power of private branch exchanges and computer systems, many managers spent time trying to determine whether to drop private lines for switched services or whether to job out voice traffic to additional long-haul carriers. Managers had to calculate whether to do business with alternative carriers they had not worked with before.

Instead of evaluating ways to use innovative telecommunications systems to shorten the distance between their companies and business partners, managers have been trying to predict when their key vendors will announce new products and whether the new products will work with current systems.

Instead of trying to design a network that will handle the future needs of their

corporations, they are scrambling to create systems that will serve new offices, or entire new companies, set up by their corporations today.

Education, users group meetings and visits to other users' facilities — all of critical importance to telecommunications managers — often took a backseat to the job of creating awareness of the communications department within the corporation. Lobbying for a bigger budget, a larger staff and more input in corporate planning also chewed up much of telecommunications managers' time.

There were still some managers who somehow made time to work on long-term projects, head users groups and develop strategic plans. Chuck Garrison, assistant vice-president of telecommunications at the Chicago Board Options Exchange; Dick Jennifer, president of the National Centrex Users Group; Dan Gonos, project manager at Domino's Pizza, Inc.; and Tom Frenette, network communications manager for Black & Decker Corp., are examples of such users.

But, for most users to have the opportunity to plan for tomorrow, they need help today. Recognition of the importance of long-range planning from top management could mean bigger budgets, an increased staff and time freed up for continuing education.

Without this senior management awareness, telecommunications managers and their staffs will be forced to deal only with the day-to-day operation of their companies' networks and postpone projects and planning that could give their companies a larger market share, increased revenues and improved customer service. □



► TELECOM DISPUTE

# Right-of-way fee war settled in Phoenix

BY MARY PETROSKY  
Senior Correspondent, West Coast

PHOENIX — Telecommunications managers and city engineers here have settled on a right-of-way fee structure that both sides say is fair and will allow the city to better manage rights-of-way.

Telecommunications managers and the city clashed during the past year after right-of-way fees jumped from \$50 annually to thousands of dollars. Right-of-way permits allow companies to run telecommunications lines under or over city property ("Users decry Phoenix right-of-way fees," NW, Oct. 12).

Members of the Arizona chapter

of the Tele-Communications Association (TCA) protested the sudden changes in the fee structure and adamantly opposed the city's plan to base the fee on the types of cable used.

Under the newly proposed fee structure, companies will pay a \$750 initial fee for underground facilities and an additional \$1.25 per linear foot, per year, for cable runs of one foot or less in width. An additional 25 cents per linear foot will be assessed for each additional foot of width.

Under the earlier proposal, users would have had to pay fees ranging from \$26.40 annually for each copper pair to as much as \$10,560 for a fiber-optic cable.

Many companies faced hefty costs for rights-of-way to run cables that allow them to set up campus-type networks where buildings were separated by public streets.

Mario Saldamando, deputy city engineer, said the city is working to develop an ordinance that will fix the fee structure and spell out the conditions for use of rights-of-way. The city is seeking more public comment and hopes to finalize the ordinance in the first quarter of 1988, Saldamando said. One issue still under consideration is whether the \$750 initial fee will be charged every year. A lower renewal fee could be implemented, Saldamando said.

TCA members Judy Holcomb and Duke Bonney were among the telecommunications managers who worked with the city to come up with the new fee structure. Both said they were pleased with the results.

"We gave them a proposal, and they were really receptive," said

Holcomb, Arizona Chapter representative to TCA's corporate government liaison committee. "It's really quite a reasonable fee structure," she added.

Bonney, vice-president of regulatory affairs for the Arizona chapter of TCA, called the new fees "acceptable and fair." He said he was particularly relieved that the city had moved away from basing fees on the types of cable crossing the rights-of-way.

Holcomb and Bonney said a key aspect of the new fee structure is that the city will now have the resources to manage the rights of way properly, ensuring that cable lines are documented. "We're reimbursing them for their costs," Bonney said.

The city will be updating its property maps to reflect accurately the type of cable in the rights-of-way, Saldamando noted. "Most of the smaller users are happy we're going to pick up the record keeping," he added. ▀

## Users exchange private lines

continued from page 11

to halve the size of its ETN.

Vincent DeGennaro, telecommunications managing director for the company, said he had been searching for an alternative to private lines for many sites.

"Because of increases in private-line costs, we could cost-justify tying only sites closely clustered around a node to the ETN," DeGennaro explained. Primerica decided to implement US Sprint Communications Co.'s Virtual Private Network service (VPN) to serve many of the rest. The ETN now consists of only two nodes serving 40 sites, and VPN is used to serve 30 sites.

DeGennaro said virtual private network services are more flexible than private-line networks. "It would be easy for us to take sites off the VPN if the company were to sell a part of its business or add sites to the net if the company expanded," he said.

Other key reasons for implementing the VPN included its uniform, seven-digit dialing plan and reduction of equipment and service maintenance costs.

Although its ETN sites are linked with T-1s, Liberty Mutual Insurance Co. has begun to explore the possibility of using virtual private network services to support some sites. Helen Custeau, assistant telecommunications manager for the firm, said she is considering services from all the major carriers. The Boston-based insurance company currently operates a 12-node ETN serving sites in Massachusetts, New Hampshire, New York and Illinois.

Another East Coast-based hybrid network user, who requested anonymity, said the ability to connect locations to a private network that don't otherwise have the traffic volume to justify dedicated lines is the most appealing aspect of virtual services.

"I would naturally prefer to link all our locations with T-1 lines, but

that is not always the best solution from a cost standpoint," the telecommunications manager explained. The company currently operates a four-node ETN network. "We have already taken between 40 and 50 locations served by our ETN and put them on [a virtual private network service]," he added.

The user said his company uses private lines to hook sites with more than \$2,000 a month in voice billing. Sites that fall below this point are connected using virtual private network services. "In many cases, we suggest our smallest locations use [AT&T Pro America I, II and III services]," he said.

Michael Greenspan, president of MBG Associates Ltd., a New York-based communications consulting firm specializing in voice services, said the cost of ETN private lines exceeds the combined cost of switched access and usage charges for a virtual private net service.

He said one of the firm's clients had been running a four-node ETN. "The cost of keeping two of the four ETN nodes on the network was rising," he said. "They decided to take them off the ETN and give the sites they served a virtual private network service." ▀

## Arizona awards \$8m PBX pact

continued from page 11

switching network.

While the PBX contract does not specify that the equipment be compatible with Integrated Services Digital Network, the state signed a second agreement with Centel calling for the eventual implementation of ISDN applications, according to Beauchat.

### First things first

"Right now, our primary focus is to bring these things up and online, and only then will we get into the ISDN applications," he said. Beauchat would not specify what those applications will be. Before issuing the RFP, Beauchat's de-

## TELECOM TIDBITS

The **Federal Communications Commission** recently established a new radio service designed to improve basic telephone service in rural areas.

Basic Exchange Telecommunications Radio Service (BETRS) will "make basic telephone service more accessible to rural households and businesses," according to an FCC statement.

Since many rural residents lack telephone service because of the high cost of wiring their homes, BETRS will connect them to the telephone network via a radio link.

"The use of sophisticated new radio technology and unused spectrum by BETRS provides another, more cost-effective alternative to connect those individuals to the telephone network," according to a statement by Dennis Patrick, chairman of the FCC.

The FCC action provides a business opportunity for companies such as International Mobile Machines Corp., whose wireless digital Ultraphone system is currently undergoing service trials with a number of telephone companies.

BETRS increases Ultraphone's potential market by making 94 radio channels available for use by fixed radio-telephone systems on a co-primary basis — 26 channels at 450 Mhz, 18 at 150 MHz and 50 at 800 Mhz.

BETRS was initiated by a petition signed by telephone trade associations, including the U.S. Telephone Association, the National Rural Telecom Association, the National Telephone Cooperative Association and the Organization for the Protection and Advancement of Small Telephone Companies.

Northern Virginia is the site of a market trial of the nation's first fully automated intercept call completion service.

**Atlantic Bell Corp.'s Customized Intercept Services (CIS)** system is the first intercept system in the country that provides automatic call completion along with a recorded message of the customer's name and telephone number. CIS will be offered to customers who are disconnecting, transferring or changing service from two central offices.

The new system is an improved version of the current automatic intercept system that provides a recorded message when a caller reaches a disconnected or changed number.

The new services include direct cut through, meaning the caller is automatically connected to the new number; cut through with referral, a message identifying the phone numbers involved; personalized message; and cut through with personalized message.

CIS is priced at \$10 to \$20 a month for residential customers and \$20 to \$30 a month for business customers, according to Bell Atlantic.

The trial is taking place in two central offices of the Chesapeake and Potomac Telephone Co. of Virginia, a Bell Atlantic subsidiary. ▀

partment participated in a Mountain Bell ISDN field trial.

### Competition culmination

The contract award is the culmination of a bidding competition that attracted major switch suppliers such as AT&T, Rolm Corp., US West Information Systems, Inc. and GTE Corp.

The decision to select the switches bid by Centel was made according to a weighted formula that assigned 55% importance to technical and architectural strength, 25% to built-in management capabilities and 20% to price, Beauchat said.

Centel Communications, a unit of Centel Corp., is a major distributor of Northern Telecom switches and is based in Chicago. ▀



# COMMUNICATIONS MANAGER

“No single issue has the potential to change the industry structure more than the price cap issue. With prudent and well-thought-out safeguards, price caps could provide enormous benefits to the [ICA] membership. Conversely, absent careful attention, this could result in major pricing and anticompetitive problems. Needless to say, we are fully committed to this issue.”

**Robert Bennis**

Director of telecommunications public policy  
International Communications Association  
Quoted from ICA's *Communique*

## ► CONFIGURATION CONFUSION

# New codes raise user ire

*Area code cutover wreaks PBX havoc.*

**BY JOSH GONZE**

Senior Writer

Telephone companies in four states recently announced plans to create new area codes, forcing private branch exchange users that route calls to those areas to reprogram their switch-routing tables.

While maintenance of PBX software is considered a routine responsibility, users said last week that new area codes create an unusual set of issues.

Tariffs have to be re-examined, services may have to be juggled and end users often will end up having to dial 10 digits to call nearby towns.

PBX users have two basic options: They can pay their switch vendor or service provider to do the software work, or they can handle the job themselves.

For most users, the choice will depend on how they usually handle software modifications.

Data General Corp., a manufacturer of minicomputers, is setting up a telephone number conversion committee to plan for the change of the company's Massachusetts area code from 617 to 508, according to corporate telecommunications manager Jack Kasper.

DG uses a Northern Telecom, Inc. SL-1 and a 10-year-old Dan-Ray, Inc. PBX to handle switching at its headquarters in Westborough, Mass. "We'll reprogram the Danray ourselves, but the SL-1 will have to be reprogrammed by Northern Telecom people," Kasper said.

Smaller users such as GCA Corp., an Andover, Mass.-based manufacturer of capital equipment for the semiconductor industry, do not have the resources to program their own switching gear and will pay the vendor to update routing tables.

GCA, which will also be affected by the New England Telephone

and Telegraph Co. 508 area code conversion, has an AT&T Dimension 600 PBX.

According to Lois Vieira, telecommunications supervisor at the company, the switch will have to be reprogrammed to deal with local calling patterns, including calls into their current area code.

To larger users accustomed to working with routing tables, such as Evanston, Ill.-based NTS Telecommunications Systems, the problem is not so daunting and can be handled in-house. "It's not actually that complex," said Alex Lapson, senior network manager at the company, a wholly owned subsidiary of Northwestern University and Northwestern Memorial Hospital that is charged with providing those two institutions with voice services.

NTS owns a pair of Northern Telecom SL-100s, which will be modified to accommodate the new 708 area code that Illinois Bell Telephone Co. has scheduled for cut-over in Chicago suburbs in Novem-

ber 1989.

"Our approach will be to build up — off-line in another computer system — text files that will incorporate all of the data-table changes in the PBX that have to be uploaded," said Phil Atwood, manager of operations at the company. "When the change occurs, we'll load that into our switch as a text file and execute it."

Atwood is using a Digital Equipment Corp. VAX 11/750 to build the new files and IBM Personal Computers to extract tables from the PBXs and transfer them to the VAX. He estimates the job will take two people working part time about three weeks.

The background required is familiarity with the VAX and with the routing tables, he said.

"What gets involved is all of the tables that handle route selection for local calling," according to Atwood. "There are tables for all of the local prefixes for our home area code. We simply have to rebuild those tables so there are two area codes and the prefix translations in each one are different," Atwood explained.

### Rates will not be affected

The Bell operating companies are telling users that rates will not be affected by the creation of new area codes, though, in the past, calls between area code regions have been treated as toll calls. "The addition of an area code will have no effect on rates," said John J. Coleman, New England Telephone vice-president for Massachusetts, in a written statement.

Nonetheless, some users are wary. "Anything from 508 to 617 will become a toll call. We have to see new rates associated with that," said DG's Kasper. "I anticipate an increase in expenses."

The issue of whether or not end users should be asked to dial 10 digits to reach destinations previously reached by seven digits also divides users.

Some customers will try to evade the extra digits with a speed-dialing function, while others will simply endure it.

"Our people have to learn how to press those three digits. There will be some confusion," said Charles Butkus, manager of network planning and operations at New England Power Service Co. in Westborough, Mass.

But GCA's Vieira wants to put the company's current area code, 617, into a speed-dialing function for calling towns that remain in that area code.

The other BOCs planning new area codes are Mountain Bell in Colorado and Southern Bell Telephone and Telegraph Co. in Florida. ▀

## GUIDELINES

**MICHAEL FAHEY**

# How fast is your OODA loop?

**W**hen U.S. Air Force researchers set out to discover why some fighter pilots performed better than others in aerial combat, they found that the most effective pilots were those who completed the so-called OODA loop the fastest.

That means that the fighter pilots who were best in mid-air duels were the fastest to complete the cycle of observation, orientation, decision and action.

As Thomas Hout and Mark Blaxill of the Boston Consulting Group pointed out recently in *The New York Times*, the OODA loop can also be used as a model in formulating business strategy.

The Air Force has developed training programs to help pilots perform better in the OODA loop and, as a result, react faster than enemy pilots.

Businesses can develop tools to help manage their own OODA loops more efficiently, thereby allowing them to respond faster than their rivals to customer needs. Communications and information systems can play an

especially important role in more effective management of the OODA loop.

In some instances, companies are using their communications and information systems to perform damage control, offsetting business problems. New York-based Chemical Bank, for example, is using personal computers to tie 200 branch offices to the bank's data center.

The personal computer network will provide the bank's customer service and telemarketing groups with information that will allow them to pitch new products and services to bank customers. New business resulting from the network will help the bank offset losses stemming from unpaid loans to Third World nations.

Forward-thinking companies in the health care industry are using communications and information systems to reduce costs and bring in new business. This move is intended to offset federal Medicare and Medicaid regulations that have cut their revenues.

Many hospitals, for example, are using communications to speed the flow of patient information throughout their facilities. In addition, some hospitals lure doctors and their patients to their facilities by providing doctors with personal computer-based links to hospital information systems.

Rexnord, Inc., a Milwaukee-based Fortune 500 manufacturing company, has increased its sales of mining equipment by using communications to support overnight delivery of spare parts.

There are many more examples of companies using communications and information systems to gather information faster, speed management decisions and deliver products quicker at lower prices.

Some companies, however, have not yet put their communications and information systems to work to better manage their OODA loops. They must act quickly or risk being shot down in business dogfights by their faster acting rivals. ▀



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Chromatic Technologies Inc.  
Cincom Systems Inc.  
CMC  
COASTCOM  
Codex Corp.  
Coherent Communications  
Systems Corp.  
ComDesign Inc.  
Communications Design Corp.  
Communications Management  
Systems Division of  
Cincinnati Bell  
Information Systems Inc.  
Communications News  
Communications Week, CMP  
Publications  
Complementary Solutions Inc.  
Compression Labs Inc.  
Compression Techniques Corp.  
Computer Cable Co.  
Computerworld  
COMSAT Corp.  
COMSAT ISS  
Comsearch Inc.  
Comsel Corp.  
Concept Communications Inc.  
Concord Data Systems  
Connections Telecommunications  
Inc.

Contel Service Corp.  
Control Cable Inc.  
Control Resources Corp.  
Corning Glass Works,  
Telecommunications Products  
CTS Fabri-Tek Inc.  
Cylink Corp.  
Cyclotomics Inc.  
Datacom Northwest Inc.  
DataComm Group  
Data Communications/McGraw-Hill  
Info. Systems Co.  
Dataradio  
Data Switch/T-Bar  
Data Tech Specialist Inc.  
Data-Tech Institute  
Datanex-Gejac  
Datapro Research Corp.  
Dataprobe Inc.  
Datatel Inc.  
Design Development Inc.  
Develcon Electronics Inc.  
Digilog Inc.  
Digital Communications  
Associates Inc.  
Digital Equipment Corp.  
Digital Link Corp.  
Digital Microwave Corp.  
Digital Pathways Inc.  
Digital Sound Corp.  
Digital Transmission Systems Inc.  
Digitel Corp.  
Doelz Networks Inc.  
Domain Systems Inc.  
DSC/Granger Associates  
DSP Technology Corp.  
Duquesne Systems  
Dynatech, Data Communications  
Group  
EBM Communications Inc.  
EDA Instruments Inc.  
EFDATA Corp.  
EICON Technology Corp.  
Electro Rep Datacomm Products  
Inc.  
Electrodata Inc.  
Ericsson Inc.  
EXCELAN Inc.  
Experdata Inc.  
Faulkner Technical Reports Inc.  
Federal Computer Week  
Federal Express Corp.  
FEDEX International Transmission  
Corp.  
FiberCom Inc.  
FiberLAN  
Fibermux Corp.  
Fibronics International Inc.  
FOCS Inc.  
Frederick Engineering Inc.  
Frequency & Time Systems  
Fujitsu America  
Gandalf Data Inc.  
General Cable Co.  
General DataComm Inc.  
General Instrument Cable Home  
Communications Group  
General Instrument, Network  
Division  
General Network Corp.  
Glasgal Communications Inc.  
Gordon Publications  
W. L. Gore & Associates Inc.  
Government Computer News  
Grass Valley Group  
GTE Spacenet  
GTE Supply  
GTE Testmark Laboratories  
Halley Systems Inc.  
Hard Engineering Inc.  
Hewlett-Packard Co., Information  
Networks Group  
Hughes Communications Inc.  
Hughes Network Services  
Hycom  
IBM Corp.  
IDACOM Electronics Ltd.

IEEE Communications Society  
Illinois Computer Cable Inc.  
INFINET Inc.  
INFORMER Computer Terminal Inc.  
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International Data Corp.  
International Microwave Corp.  
Intratec Systems Inc.  
ISC Datacom  
ITT Corp.  
Jenks & Son  
Jupiter Technology Inc.  
Kentrox Industries Inc.  
P. Kirvan & Associates  
KMW Systems Corp.  
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Lanier Business Products  
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LDX NET Inc.  
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Lightwave Systems Inc.  
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McCourt Advanced Network  
Systems  
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MCS Inc.  
Memotec  
Metrocast  
Microtronix Systems Ltd.  
Microwave Networks  
MIS Week  
Mitel Datacom/British Telecom  
Datacomms  
Mod-Tap System  
Motorola Inc.  
Mountain Bell/Northwestern  
Bell/Pacific Northwest  
Bell/US WEST Companies  
National Telecommunications  
Network  
Navtel Inc.  
NEC America Inc.  
Netcon, A Division of C & S  
Construction Inc.  
NETRIX Corp.  
Network Communications Corp.  
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Network Equipment Technologies  
Network Systems Corp.  
Network World  
Nevada Western  
Newbridge Networks Inc.  
Nissei Sangyo America, Ltd.  
North Hills Electronics Inc.  
North Supply Co.  
Northern Telecom Inc., Integrated  
Network Systems  
Northern Telecom/Spectron  
NOVA USA  
Novell  
NYNEX Corp.  
Omnicom  
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Optelecom Inc.  
Optical Data Systems  
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PC Week  
Phoenix Microsystems Inc.  
PictureTel Corp.  
Pirelli Communication Systems  
Powell-Pendergraph Inc.  
Progressive Computing Inc.  
Proteon Inc.  
Pulsecom Division, Hubbell Inc.  
Racal-Milgo  
Racal-Vadic  
Racon Inc.  
Rad Data Communications Inc.  
Raycom Systems Inc.  
Reliable Electric/Utility Products  
Renex Corp.

Rockwell International  
Sargent Fiber Optic Services  
Satellite Communications  
Magazine  
SBE Inc.  
Scientific-Atlantic Inc.  
Seiscor Technologies Inc.  
Siecor Corp.  
Sequel Data Communications Inc.  
Sorbus, A Bell Atlantic Co.  
South Central/Southern Bell  
Telephone  
Southwestern Bell Telephone  
Spectrum Planning Inc.  
Stonehouse & Co.  
StrataCom Inc.  
Suntel Systems Corp.  
Symplex Communications Corp.  
SynOptics Communications Inc.  
T-Bar/Data Switch  
Technology Transfer Institute  
Tekelec  
Telco Research Corp.  
Telco Systems Network Access  
Corp.  
Tele-Measurements Inc.  
Telebyte Technology Inc.  
Telecom Publishing Group  
Telecommunications  
Telecommunications Techniques  
Corp.  
Teleconnect and LAN magazines  
Telelogic  
Telenet, A US Sprint Co.  
Telenex Corp.  
Telephone Angles & IS Analyzer  
TELEPHONY Division, Intertec  
Publishing Corp.  
Tele/Scope  
TeleStrategies Inc.  
Tellabs Inc.  
Teltone Corp.  
TelWatch Inc.  
The ARIES Group  
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3COM Corp.  
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Network Systems Co.  
Unicom Electric Inc.  
Unidata Corp.  
Universal Data Systems  
US Sprint Communications Co/  
Telenet  
US WEST Network Systems Inc.  
Verlink Corp.  
Versa-Lite Systems Inc.  
Versitron, A Division of Keene  
Corp.  
Vertex Computer Cable & Products  
Video Telecom Corp.  
VIR Inc.  
Vitalink Communications Corp.  
Wandel & Goltermann Inc.  
Washington International Teleport  
Wegener Communications Inc.  
Wellfleet Communications Inc.  
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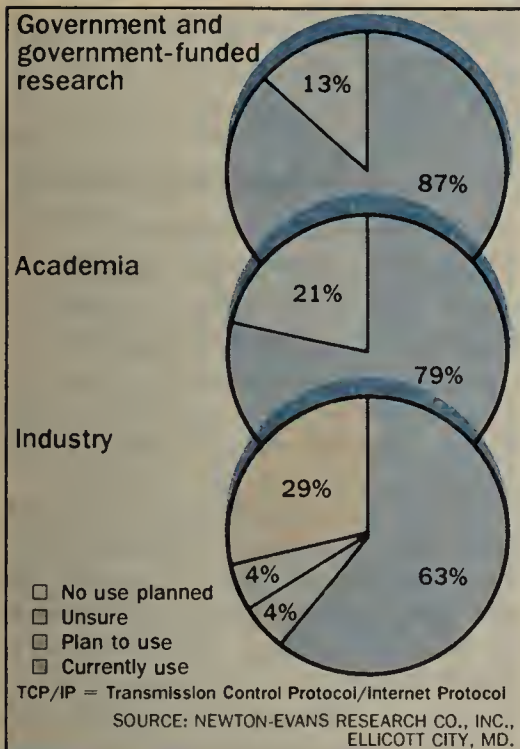
# LOCAL NETWORKING

“People think they’re going to save a lot of money by going with twisted-pair Ethernet, but, in the end, they’ll spend more because of the labor involved in testing for usable existing wire.”

**Michael Coden**

President  
Codenoll Technology Corp.  
Yonkers, N.Y.

## Users reveal plans for TCP/IP



## PC NETWORKS

# Experts favor Novell OS/2 plan

*But some predict troubleshooting woes.*

**BY MARY PETROSKY**

Senior Correspondent, West Coast

Industry analysts gave a general thumbs up to Novell, Inc.'s recently announced plan to use a coprocessor to support OS/2 applications designed to run on file servers. But a few pundits expressed reservations about troubleshooting problems.

Though Novell expects few server-based OS/2 applications to be developed for local networks during the next year, the company felt

obliged to reveal its plans for supporting server-based OS/2 applications in order to alleviate customer concerns ("Novell details OS/2 support," NW, Dec. 14). These concerns were fueled by statements from Novell executives that the company would not license Microsoft Corp.'s OS/2 or its LAN Manager networking tools.

Rather than license OS/2, Novell will provide a coprocessor that will be installed in NetWare-based servers to run OS/2 applications. The coprocessor is being designed

to operate with IBM's OS/2 Standard and Extended Editions.

This coprocessor approach is "definitely a viable solution," said Douglas Whitman, vice-president in the San Francisco office of brokerage firm Alex Brown & Sons, Inc. "We feel all right about the technical approach."

Some analysts pointed out that Novell users will have to pay in the vicinity of \$500 to \$800 for a coprocessor to run OS/2 applications. By contrast, licensees of the LAN Manager, such as 3Com Corp., will be able to support these applications directly on file servers at no additional cost. Whitman acknowledged that users with small networks might balk at having to buy a coprocessor. Most large local net users, however, "wouldn't even think about" the extra cost.

Whitman and other analysts noted that coprocessors are used

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## HIGH-END WORKSTATIONS

# Apollo widens Ethernet support to full line

**BY PAULA MUSICH**

Senior Editor

CHELMSFORD, Mass. — Apollo Computer, Inc. recently completed support of Ethernet across its workstation line with the addition of an Ethernet controller for its high-end graphics workstations and network server.

Apollo announced the 802.3 Network Controller-VME for its VME bus-based DN580 and DN592 Turbo graphics workstations and for its DSP500-T network server.

Prior to the company's an-

nouncement, these workstations and the server worked only with Apollo's proprietary 12M bit/sec token-ring links.

"We're the only workstation vendor to offer customers a choice of networks across the whole product line," said Dave McCrabb, senior product manager for networking at Apollo.

Customers can run both types of networks and interconnect each by installing both an Ethernet and Apollo token-ring network adapter in the same workstation.

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## NETWORK NOTES

**Excelan, Inc.** unveiled what it says is the fastest intelligent Ethernet network adapter for Digital Equipment Corp.'s Unibus-based computers, such as the VAX. The EXOS 304 Ethernet adapter, which uses an Intel Corp. 80286 microprocessor to process networking protocols, is as much as 75% faster than Excelan's current Unibus Ethernet adapter, the company said.

The adapter operates with Excelan's Transmission Control Protocol/Internet Protocol software, which includes networking applications such as File Transfer Protocol file transfer, Telnet terminal emulation and Simple Mail Transfer Protocol electronic mail.

The adapter is available now

and is priced at \$3,520. The price of Excelan's current EXOS 204 Ethernet adapter for Unibus-based computers was reduced by 25% to \$2,120.

Provo, Utah-based **Novell, Inc.** released a network management and diagnostic program with the shipment of its System Fault Tolerant (SFT) NetWare Version 2.1 network operating system. The NetWare Care program, which operates with SFT NetWare Version 2.1, allows network administrators to gauge the efficiency of file server configurations, monitor network performance and view the logical layout of network workstations. It

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## LANMARKS

**ERIC KILLORIN**

# LAN confusion is the disorder of the day

**R**eaders expecting to learn about bit rates and cabling alternatives in this week's column are going to be disappointed. The new year is here, so it's more appropriate to discuss issues with greater impact — issues that confront all communications industry participants, particularly those involved in the local network game.

First, to set the stage: The market for networking products and services is still fragmented, and user confusion is still the disorder of the day. Since the local-area network market's inception, vendors have come and gone — and have come back again. Corvus Systems, Inc. is a good example. Suppliers continue to make much of the technological differences in their product lines and avoid the more important issues of distribution, service and network management.

Users try to make some sense from the chaos. Market researchers continue to find user uncertainty in the marketplace, with a high percentage

of, "Yes, but I'm not sure which one," responses to questions such as: "Do you plan to install a local network?"

Worse, vendors with the greatest visibility invariably top users' vendor selection lists only because the power of advertising overcomes product capabilities.

And then there was the calamity of Black Monday (Oct. 19), which led some pundits to speculate that capital spending for computer equipment will take a hit across the board. That, of course, is absurd. The cyclical nature of the computer market — like that of the U.S. economy and Wall Street itself — is the more appropriate indicator.

The computer industry has just come off two lousy years — arguably, three, since 1987 was a catch-up year — in which users' budgets were frozen and the equity in publicly traded vendor companies took a real beating. Next year, expect the coffers to open and purchases of computer equipment to increase dramatically. Local networks will be the biggest beneficiaries of this growth, since the centralized approach to computing has al-

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*Killorin is the publisher of "Netline," an industry newsletter on computer networks, a publication of Hyatt Research Corp. in Andover, Mass.*



# Apollo widens Ethernet support

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This capability, provided through a routing function included in the new adapter, allows similarly configured Apollo workstations on each network to communicate.

Although the adapter's \$4,000 price tag is higher than competitive Ethernet adapters for VME bus-based systems, McCrabb said the adapter's routing capabilities can bring down total network costs.

"Although the price of the Ethernet adapter is higher than some competitive offerings, you get the routing capabilities without having to buy any additional software," McCrabb said.

"This makes routing less expensive," he added.

Users running Apollo's Domain networking software on different networks can communicate across the link, whether they are on Ethernet or Apollo token-ring networks.

"Workstations on either side of the link see the same files and file system," McCrabb said, adding that "they access the same peripherals and other network resources."

In addition, Digital Equipment Corp. VAX/VMS systems sharing the same Ethernet with Apollo workstations can route Transmission Control Protocol/Internet Protocol packets through the routing link.

Apollo initially signaled its intention to provide Ethernet sup-

port for its high-end workstations last April, when it unveiled Ethernet links for its Series 3000 workstations, which use an IBM Personal Computer AT-compatible bus.

Then, company officials said Ethernet support was necessary because many prospective workstation customers refused to use any networking scheme but Ethernet.

Despite strong user demand for industry standard Ethernet, however, 90% of Apollo workstations are shipped with token-ring links, McCrabb said.

"Since we've been Ethernet vendors, instead of competitors, people may have realized that Apollo's token ring has some distinct advantages — it's faster, more manageable, and it's deterministic," McCrabb said. □

# Apollo widens Ethernet support

continued from page 15

ready had its brief and shining moment. Distributed computing, now the rule of the day, mandates local-area networks. (The Nov. 30 issue of *Business Week* features a cover story on the fading era of the mainframe. This is required reading.)

But then there is the political scene. The new year is an election year, and election years have an unpredictable effect on the economy. While spending for computer equipment will be on the rise, it could be checked if the election

Current events often influence spending habits over the long-term — one reason for Black Monday.

yields a vacuum in the White House.

Why? It should be obvious: Right or wrong, current events often influence the outcome of spending habits over the long-term — which is one of the reasons for Black Monday.

So, an apology is in order for those readers expecting more positioning statements on local network vendor wars and why IBM's Systems Application Architecture won't help Big Blue defeat Digital Equipment Corp. in the middle tier.

The fate of the local network market is tied to the fortunes of peripheral events, and those users with a clear understanding of the whole picture will be the most competitive. And isn't that why companies buy computers anyway? □

## Network Notes from page 15

also highlights wiring or connection failures on the network.

The program can operate in single networks or with multiple sub-networks bridged together. The single-network version is priced at \$495, and the multiple-network version is priced at \$1,995 for as many as four networks. An additional surcharge of \$395 per network is charged for supporting more than four networks.

Novell also announced that it will offer a promotional discount for SFT NetWare Version 2.1. The \$800 discount will be offered through April 23.

**Microsoft Corp.**, based in Redmond, Wash., will hold two conferences for MIS managers, network consultants and software developers to explain the role of OS/2 in local networks using IBM's LAN

Server or Microsoft's OS/2 LAN Manager software. The first conference will be held in San Francisco from March 30 to April 1, and the second will be held in New York from April 13 to April 15. The cost of each conference is \$750. For additional information, call Microsoft's LAN conference department at (206) 882-8080.

IBM Token-Ring-compatible network supplier **Madge Networks, Inc.** announced a Token-Ring network adapter for IBM Personal System/2 Models 50, 60 and 80. The MCA Ring Node, which is designed to operate with the Personal System/2 Micro Channel-bus architecture, can be used interchangeably with IBM Token-Ring network adapters, according to the company. It is compatible with net operating systems such as Novell's NetWare, Microsoft's MS-Net-

works, IBM's PC LAN Program and Madge Network's Netserver software. The adapter will be available in the first quarter of 1988 and will cost \$795. Madge Networks is based in Roanoke, Va.

Mountain View, Calif.-based **Network General Corp.** added support in its Sniffer protocol analyzer for the Network Basic I/O System interface standard developed for the Department of Defense's TCP/IP suite of networking protocols. The enhancement, made to the Sniffer's PA-1304 TCP/IP option, allows users to collect, record and analyze real-time performance statistics for NETBIOS-based applications and network operating systems running on TCP/IP networks. The upgrade, available now, is free to current PA-1304 TCP/IP protocol suite option users and costs \$995. □

# Experts favor Novell OS/2 plan

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already by local net vendors in a variety of applications to increase network performance. Novell offers a coprocessor board for NetWare servers that speeds up disk access. 3Com uses a coprocessor on its high-end Ethernet adapter to perform protocol processing, off-loading this task from the server or workstation.

The NetWare Application Coprocessor will support OS/2 applications while the server processor remains dedicated to network operations under NetWare. In discussing this strategy, Novell executives emphasized the difficulty of developing server-based applications. They stressed that applications may run better on a separate computer, known as an external server or an application server, than on the file server itself.

"A server-based application has to be written specifically to take advantage of a network architecture. It doesn't come automatically with the operating system you put on the [workstation]," said Craig Burton, Novell's senior vice-president for corporate development. Application developers must determine how to divide the application

between the server and the network workstations, which is not a simple task, Burton said.

Also, users must consider the impact on network performance and reliability of having the file server perform both network functions and application processing. "It isn't a foregone conclusion that taking everything and piling it into the server will make it run faster — it may actually run better outside of the server," Burton said.

Server-based applications that may run better on an external server include communications gateways and print or queue servers that do not require frequent access to files in the file server, according to Novell. Applications such as data base management systems that require frequent access to files on the server may benefit from executing within the file server itself.

Novell is not alone in questioning the wisdom of layering applications on top of a server. "In the OS/2 world, I have personally been concerned about the amount of overhead applications will take in the file server," said Thomas White, chairman and chief execu-

tive officer of Infonetics, Inc., a market research firm in Santa Clara, Calif. "Off-loading applications seems like a good idea from a performance perspective."

Novell explained its NetWare Requestor will support server-based OS/2 applications running on application servers. The Requestor is an OS/2 module that will provide NetWare services to OS/2 users. It was developed by Novell with assistance from IBM.

Both the application server and the network workstations would run OS/2 as well as the NetWare Requestor. The workstation would make requests for application services to the application server through the Requestor. The application server, in turn, could make requests to the NetWare file server's file system via the Requestor. All requests for services and their replies would be moved across the network via a transport protocol such as IBM's Network Basic I/O System or Novell's Internetwork Packet Exchange.

Similarly, the NetWare Application Coprocessor could be configured with the OS/2, the OS/2 applications and the NetWare Requestor. The Requestor could be used to communicate with the NetWare server's processor in a memory-to-

memory transfer over the server's bus. Workstation requests to the NetWare Application Coprocessor could be sent to the file server, where the NetWare operating system would pass them off to the application on the coprocessor.

Infonetics' White says the server's bus is so fast that there is little chance for degradation as data is passed between the server processor and the coprocessor.

Two market watchers warned that having both the file server functions and a coprocessor running applications in the same computer could make it difficult to find problems. "Problem determination will be a nightmare," said John McCarthy, director of the Professional Automation Service at Forrester Research, Inc., in Cambridge, Mass.

If the application running in the coprocessor fails to respond to a user's request, the network administrator will have to determine whether the problem is with the network, NetWare or OS/2, said Scott Haugdahl, senior systems specialist at Architecture Technology Corp. in Minneapolis.

Infonetics' White did not see troubleshooting as a significant drawback to the coprocessor scheme, however. □



# DATA DELIVERY/ NET MANAGEMENT

## ► MULTIPLEXER MARKET

# DCA aspires to T-1 heights

*Marketing, sales plan may pave way to long-term success.*

**BY PAUL KORZENIOWSKI**  
Senior Editor

ALPHARETTA, Ga. — After a difficult transition, Digital Communications Associates, Inc. (DCA) appears poised to establish itself as one of the top three vendors in the T-1 multiplexer market.

DCA entered the market in June 1986 with the acquisition of start-up T-1 multiplexer maker Cohesive Network Corp., based in Los Gatos, Calif. The company has since resolved marketing problems it inherited from Cohesive, added new, much-needed distribution channels and rounded out the product line to make it appeal to a broader audience.

For its efforts, DCA garnered only a 6% share of the T-1 multiplexer market in 1987, according to Mara Novak, a research analyst at Gartner Group, Inc., a Stamford, Conn., market research firm. Many

key contracts were awarded during the year to archcompetitors Timeplex, Inc. and Network Equipment Technologies, Inc. (NET).

Market share is crucial in the competitive T-1 market because only companies with sizable installed bases will survive a pending market shakeout, according to Steven Levy, a communications analyst at Hambrecht & Quist, Inc. in San Francisco. He predicts that, in 1990, four to six companies will control the entire T-1 market, each selling at least \$50 million of T-1 gear per year.

To emerge as a key competitor, DCA will have to leverage the architectural strength of its System 9000 multiplexer, industry analysts said. Andy Schopick, vice-president at Gartner Securities Corp., a financial analysis company in Stamford, Conn., said only one product, NET's IDNX multiplexer, offers features comparable

to the System 9000.

Joseph S. Rosenthal, vice-president of DCA's network communications group, said the System 9000 has a 128M bit/sec backplane, which is sufficient horsepower to support two 45M bit/sec T-3 lines. No other product can match that feature.

But despite its impressive architecture, the System 9000 has not gained widespread market acceptance, a fact that Schopick blames on Cohesive's early marketing strategy.

Rosenthal admitted that Cohesive initially paid more attention to technical issues than marketing. "The company's pricing structure was silly, so the product didn't appear appealing to companies with small networks," he said.

Cohesive only had a six-person sales force covering the country and, compounding matters, later had the misfortune of entering into

"TCP/IP is talked about, rather than actually being installed. The protocol may be important in a few industries — such as aerospace and the stock trading floor — that rely on high-powered Unix workstations. But there has not been a ground swell of support for TCP/IP in the commercial sector.

**Vince Barrett**  
Vice-president  
Gartner Group, Inc.  
Stamford, Conn.



John Douglas

an unfruitful OEM agreement with General DataComm Industries, Inc.

Recognition of these shortcomings was one reason why Cohesive opted for the DCA buyout offer. Shortly after that, DCA set out to rectify some of the problems.

In January, DCA bolstered the product line with the introduction of smaller models of the multiplexer intended to be more attractive to small and medium-sized network users. And DCA lured key sales managers from NET and Timeplex

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## DATA DIALOGUE PAUL KORZENIOWSKI

# Hot trends and top hype

**W**hen 1987 began, IBM did not sell a T-1 multiplexer, AT&T did not have an integrated network management system, Digital Equipment Corp. President Ken Olsen was held in esteem by General Motors Corp., and Network Equipment Technologies, Inc. was a privately held company.

Much has changed in the last 12 months. Industry attention constantly shifted, as users and vendors tried to sift important issues from hyperbole. Here are some examples of the year's most important trends and worst instances of hyperbole.

One of 1987's most important events was Unisys Corp.'s acquisition of Timeplex, Inc. This deal foreshadows a fundamental shift in the data communications industry.

During 1988, analysts expect a number of suppliers to be gobbled up. Research and development costs are escalating, and profit margins are decreasing. The data communications industry could come to resemble the computer business more quickly than anyone predicted.

Second, airlines dramatically expanded their networks during the past year. The International Communications Association (ICA) reported that communications spending increased by 26% in the airline industry, the largest increase in any industry.

A number of the carriers spun off subsidiaries that are expected to be independent profit centers. But competition in the reservation net business has increased dramatically, and it will be interesting to see how many subsidiaries turn a profit in the next few years.

Third, customers began demanding more systems integration services from suppliers.

Users no longer want suppliers to drop networking equipment off at the loading dock. They are demanding that vendors help design, debug and manage networks. An interesting battle began to take shape between carriers and data communications suppliers, both of which are looking to supply systems integration services.

Fourth, Transmission Control Protocol/Internet Protocol

emerged as a suitable method of linking different types of computer systems. The protocol, historically used only by universities and government agencies, began to feel at home in the commercial sector.

Customers found that TCP/IP delivers many of the benefits that, at this point, the International Standards Organization's Open Systems Interconnect (OSI) model only promises.

Fifth, V.32 modems met with healthy market acceptance. These modems support 9.6K bit/sec transmission over dial-up lines. Vendors reported sizable order backlogs as many of the nation's largest customers opted for the high-speed modems.

Along with these important events, there was a lot of hype in 1987.

Lip service by vendors for the OSI model tops the list. Without application software, the world's most technically elegant network model is almost useless. After 10 years of talk, OSI supports only a few electronic mail and file transfer ap-

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## ► ELECTRONIC MAIL

# Wang adds gateway to DEC E-mail

**BY JIM BROWN**  
New Products Editor

LOWELL, Mass. — Wang Laboratories, Inc. recently unveiled software that enables users of its Wang Office electronic mail package to exchange messages and documents with users of Digital Equipment Corp.'s All-In-1 office software.

Wang's InterOffice software complements existing Wang products supporting E-mail as well as document interchange between Wang Office and IBM's Professional Office System (PROFS) and DISOSS.

The InterOffice gateway software consists of two components, one residing on a Wang VS minicomputer, the other on a DEC VAX minicomputer.

The two minicomputers are connected via an asynchronous RS-232 link operating at up to 9.6K bit/sec.

Developed for Wang by The Boston Software Works, Inc., InterOffice fits into the Wang Information

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# Hot trends and top hype

continued from page 17

plications. Even with the backing of the world's largest companies, work on the model progressed at a snail's pace.

Integrated network management chatter was a very close second. Despite all the talk, no vendor is close to solving problems raised by consolidating various net management systems.

Few vendors have a good system for managing their own equipment, let alone managing other suppliers' wares. The task of bringing their own systems under an umbrella will keep most vendors occupied throughout the new year. Truly integrated network management systems are at least two years away.

Also, IBM's Systems Application Architecture (SAA) was depicted to Big Blue customers as a panacea.

Faced with a confusing array of inconsistent operating systems, communications protocols and user interfaces, IBM made a smart marketing move. The company promised to fix the problems with a new application architecture. Customers and software vendors expect SAA to help them develop software that runs on all IBM systems.

SAA will make the task easier, but it will never be easy. To develop a suitable architecture, IBM would have to discard certain products with sizable installed bases.

The industry giant may be unwilling to make such dramatic moves. It has already sidestepped one such issue: IBM's IMS data base can run only on a mainframe;

it was not designed for the mid-range or microcomputer environment. Rather than leaving IMS out of SAA, IBM said the data base will support an application program interface so it can take part in an SAA environment.

Once SAA is fully fleshed out, it may become as confusing as the company's current architectures.

Analysts and vendors portrayed the T-1 multiplexer business as an emerging market. Despite healthy market growth, there is little opportunity for new vendors to gain significant market share. The bulk of the growth in the next few years will come as existing customers expand their nets.

The five companies leading the pack in 1987 will be the leaders in 1990.

Finally, it's been said that DEC's recent financial success stemmed from superior networking products. DEC's networking products are good but certainly not great. Other vendors offer better connectivity to IBM systems, more robust network management products and support for a wider range of network topologies. DEC still hasn't developed a proven way of integrating microcomputers with its systems.

DEC's success came from its VAX line, which consists of processors that are more powerful than competitive offerings. Also to be credited is the application software that runs on these systems, as well as a sales force that knows how to compete with IBM.

The company's networking products certainly contributed to DEC's success but were not the primary reason for it. ▣

# Wang gateway to DEC E-mail

continued from page 17

Transfer Architecture (WITA). InterOffice also works with another software package Wang released recently, CopyWITA. Together, the packages convert Wang Word Processing or WP Plus documents to DEC WPS-Plus documents.

For example, InterOffice forwards Wang WP and WP Plus documents that are being sent to an All-In-1 user to CopyWITA. CopyWITA translates them to the WITA data format and passes them back.

InterOffice then converts the WITA format to DEC's DX document architecture format and sends the converted document across the link. InterOffice on the DEC VAX passes the document to All-In-1, which converts the DEC DX format to a DEC WPS-Plus document.

Converting documents to WITA and then to DEC DX enables Wang to adjust more easily to any future changes in DEC's document architecture format, according to Jackie Appel, Wang's group product marketing manager for office applications.

It also enables documents converted from DEC DX format to WITA format to be forwarded to Wang's PROFS or DISOSS gateways. Those gateways would then convert the WITA format to an IBM format.

InterOffice will remove from the file WITA-supported data elements that WPS-Plus documents do not support. Those elements include binary file segments, graphics and

image data.

A message is sent to the All-In-1 user saying that such elements were removed and that other document conversion facilities must be used in order to import them.

As for E-mail messages, InterOffice converts Wang Office mail to an ASCII file forwarded to All-In-1. All-In-1 converts the ASCII file to an All-In-1 mail message and delivers it.

Wang's current and future E-mail gateway products are providing the company with a migration path toward implementation of the CCITT's X.400 E-mail interchange standard, Appel said.

"You'll see additional gateways between Wang and other departmental systems. And X.400 is included in that spectrum of gateways," she said.

Dave Terrie, editor of "Patricia Seybold's Network Monitor" newsletter and a consultant with Scituate, Mass.-based NewPort Consulting, said the product is not a major strategic thrust.

He said it is a response to the needs of large users looking to link their existing Wang and DEC office systems.

"This is very much a stopgap product. The real way to get into DEC is to do it through X.400," Terrie said.

InterOffice is priced between \$6,500 and \$24,500, depending on the VS or VAX systems used. CopyWITA is priced between \$250 and \$1,000, depending on the VS system.

Wang Laboratories has headquarters at One Industrial Way, Lowell, Mass. 01851, or call (617) 459-5000. ▣

# DCA aspires to T-1 heights

continued from page 17

to augment DCA's 60-person direct sales force.

The most difficult change was shifting DCA's traditional sales and marketing focus to accommodate the Cohesive acquisition.

DCA is divided into two autonomous product groups. One group handles the company's Irma microcomputer-to-mainframe product line. The second group sells a variety of data communications products, including X.25 packet assembler/disassemblers, local networks and a point-to-point T-1 multiplexer.

Historically, the latter group sold equipment on a piecemeal basis. But the market has evolved away from the box buy to the system buy, making the most important piece of data communications equipment the T-1 backbone multiplexer. Once customers purchase a vendor's T-1 multiplexer, the theory goes, they are more likely to look to the same vendor for other network products.

Recognizing this shift, DCA had to position the System 9000 as its most important product. John Douglas, president of DCA's network communications group, said making that change was difficult because the System 9000 wasn't developed by DCA engineers.

"Only recently have we begun to see enthusiasm from our development team," he said.

Feeding that enthusiasm is the ongoing development of an integrated network management system.

Like other vendors, DCA is working to bring all of its products under one management system and trying to develop links between its systems and other vendors' products, like IBM's NetView.

The company's overall efforts seem to be paying dividends.

Rosenthal said the System 9000 customer base has grown to more than 35 companies, including leading edge users such as Fidelity Systems Co., Chase Manhattan Bank, N.A., American Presidents Line, Ltd. and MasterCard International, Inc.

Customers seem satisfied with the System 9000's capabilities, as well as DCA's support.

Fred Muller, manager for data engineering and implementation at Fidelity in Boston, said, "DCA has been willing to work closely with us as a partner. The company may move more slowly than competitors because it is committed to quality. We think that, in the long term, the DCA product will prove to be more solid and robust than

other multiplexers."

In addition to increasing its customer base, DCA dramatically expanded the distribution of the System 9000. In the last six months, the company inked OEM agreements with BellSouth Corp., Northern Telecom, Inc., Racal-Milgo, Inc. and Infinet, Inc.

"The window of opportunity is relatively small, so we are not taking any chances," Douglas said. "We are pulling out all the stops to get as much business as quickly as we can."

Douglas said the agreements will enable the company to reach new markets. The Northern Telecom deal will enable DCA to gain a portion of the large contracts typically awarded to systems integrators such as Electronic Data Systems Corp. BellSouth will reach customers in remote areas of the South. Racal-Milgo and Infinet can sell the System 9000 to their large installed bases.

But Gartner Group's Schopick said the various distribution channels are not neatly divided, and he said he expects situations in which DCA salespeople and those of one or more of the OEMs will call on the same customers.

Douglas said DCA has instituted a commission policy that rewards salespeople for cooperating with OEMs. "We don't want to be forced into situations where we are un-

dercutting our own partners and ourselves," he said.

The recent successes improve but do not guarantee the company's chances for long-term success. DCA must still address product and marketing issues. Levy, of Hambrecht & Quist, said DCA should stop talking about the System 9000's T-3 capabilities and start delivering them.

Fidelity's Muller would like to see a more cohesive approach from DCA and the Cohesive Network group, which still works out of Los Gatos.

"When there are questions about invoices, it becomes very obvious we are dealing with two companies," he said.

In the long term, DCA may find it has to form alliances with an established computer maker, as NET did with IBM and Timeplex did with Unisys Corp.

Rumors link DCA with Digital Equipment Corp. "In the next 12 months, we expect DCA to be acquired," predicted Tim Zerbic, vice-president at Vertical Systems, Inc., a Dedham, Mass., consulting firm.

But Douglas denied the reports and said the company expects substantial revenue growth during 1988.

"We see no reason why we will not grow at the rate NET grew during the last year," he said. ▣



# NEW PRODUCTS AND SERVICES

Coming in the Jan. 11 issue:

► Datacom Buyer's Guide to T-1 multiplexers

## SOFTWARE ENHANCEMENT

# Data Interface boosts micro-to-mainframe tool

BY JIM BROWN  
New Products Editor

AUSTIN, Texas — Data Interface Systems Corp. recently enhanced its microcomputer-to-mainframe gateway software by adding an application program interface (API) and new gateway management tools.

The new functions are part of Version 2.2 of the firm's DI3270 software, which enables an IBM Personal Computer to emulate an IBM 3274 terminal controller. Stand-alone or networked IBM Personal Computers and compatibles outfitted with the software look like IBM 3278 terminals to an IBM mainframe.

The API in Version 2.2 enables a programmer to write Personal Computer applications capable of transparently initiating an emulation session.

Once initiated, an API routine can transparently link a Personal Computer to a mainframe and download requested data in response to Personal Computer application commands.

The new DI3270 API will work only with Personal Computer programs written with Lattice, Inc.'s C Compiler. APIs supporting applications written with other Personal Computer programming packages will be available later in 1988.

The new version also includes Personal Computer Gateway Monitor software. This package enables network administrators to access a Personal Computer running DI3270 software to determine which microcomputers in a local network running Novell, Inc.'s Advanced NetWare have a mainframe session in progress.

In addition, the Gateway Monitor software determines the terminal identification number assigned to each Personal Computer in emulation mode. By determining terminal identifications, the network administrator is able to prevent the

gateway from assigning terminal identification numbers the mainframe no longer recognizes. Terminal identification numbers enable hosts to determine which mainframe applications the Personal Computer is authorized to access while in emulation mode.

The new version also extends the DI3270 configuration options to include enabling a work group of Personal Computers to contend for a limited group of terminal identification numbers.

Existing DI3270 gateway software can be configured to assign terminal identifications in one of two ways. The software can be configured either to assign terminal identifications sequentially or have certain terminal identifications dedicated to a specified Personal Computer.

By dedicating a terminal identification to a Personal Computer, a network administrator can more easily control which mainframe applications the Personal Computer is able to access.

With the new configuration function, a work group of Personal Computers requiring access to the same mainframe applications is now able to contend for a single dedicated terminal identification number.

Existing DI3270 functions enable Personal Computers to establish up to four concurrent mainframe sessions and support file transfer with the host. Host connections use IBM's Synchronous Data Link Control or Binary Synchronous Communications protocols at speeds up to 9.6K bit/sec.

Pricing for DI3270 Version 2.2 ranges from \$1,995 for a package supporting up to 16 mainframe sessions to \$4,495 for a package supporting up to 254 sessions. A version of the software for stand-alone Personal Computers is priced at \$575.

Data Interface Systems can be reached by writing P.O. Box 4189, Austin, Texas 78765, or call (800) 351-4244; in Texas, call (512) 346-5641. □

## DATA-OVER-VOICE TECHNOLOGY

# Board links PCs via twisted pair

BY JIM BROWN  
New Products Editor

NEW YORK — Radan Voice and Data Networks, Ltd. recently introduced an expansion board that uses data-over-voice technology to link IBM Personal Computers in a local network via existing twisted-pair wire.

The LDV-2/PC board provides two RJ-11 ports, one to support a telephone and the other to connect to a wall jack. It enables a Personal Computer and a telephone to share the same twisted-pair wire running between a desktop and a building wiring closet.

At the wiring closet, each twisted-pair wire supporting data-over-voice transmission must be linked to either Radan's rack-mounted LDV-2 card or passive line filters located in front of a private branch exchange. Those products separate the data and voice signals and route them accordingly.

A subsidiary of Rad Data Communications, Inc.,

the Israel-based Radan designed the board to broadcast data at a frequency that is above that of a voice channel. The board will support asynchronous data rates of up to 19.2K bit/sec in half- or full-duplex over distances up to 5.6 miles.

The LDV-2/PC supports the same communications software used with IBM's Asynchronous Communications Adapter, such as Crosstalk, made by Crosstalk Communications, a division of Digital Communications Associates, Inc.

The LDV-2/PC complements the firm's existing stand-alone LDV-2, which provides an RS-232 computer port and an RJ-11 telephone port. A second RJ-11 is used to link to the wall jack. The LDV-2 also supports synchronous and asynchronous data.

Each LDV-2/PC board costs \$270 and will be distributed in the U.S. by Rad Data Communications.

Rad Data Communications is located at 151 W. Passaic St., Rochelle Park, N.J. 07662, or call (201) 587-8822. □

## First Look

### Peripheral sharing switch suppresses surges, spikes

**Bravo Communications, Inc.** introduced a line of manual peripheral sharing switches that protect against electrical surges and spikes.

The firm's **Sure/Fire** peripheral sharing switches enable two or four peripherals to share a single host port. The switches come in versions that support either serial or parallel communication ports.

The switches are designed to reduce electrical surges and current spikes caused by turning a knob or pushing a spring-loaded button to switch connections between devices. If not suppressed, those surges and spikes can burn out a communications board in the peripheral or a host.

Sure/Fire products feature brushed aluminum rotary switch contacts, all-metal shielded enclosures and shielded connectors that guard against electrical surges and spikes. The units also use a transient voltage suppression silicon diode to keep incoming voltages at specified levels.

A version enabling two peripherals to share a host port costs \$189.

*Bravo Communications, Inc., 460 Partridge Court, San Jose, Calif. 95121, or call (408) 270-4500.*

### Subrate multiplexer feeds DDS, T-1 lines

**TeleProcessing Products, Inc.** introduced a subrate data multiplexer (SDM) that feeds multiple, lower speed channels to a backbone network consisting of 56K bit/sec or T-1 lines.

The basic desktop **TP-972 SDM** supports five input channels, each operating at up to 9.6K bit/sec. The TP-972 SDM can be expanded to support up to 20 channels, with each operating at 2,400 bit/sec. The unit is configured and tested via menu-driven front-panel display commands.

Each channel on the unit is capable of supporting a secondary channel that carries diagnostic information via the backbone network to a network management center. The unit also supports an RS-232 connector for each channel and will support formatting compatible with AT&T's Digital Access and Cross-Connect system or a D4 channel bank.

The unit can be configured to support a composite link that has a primary channel of 56K bit/sec and a secondary channel to carry diagnostic information at up to 2,400 bit/sec. That 56K bit/sec composite link can be directly connected to AT&T's Dataphone Digital Service with the secondary channel. The unit can also be configured to support a four-wire DS0 channel, operating at 64K bit/sec, that directly connects to a D4 channel bank.

The TP-972 SDM costs \$3,350.

*TeleProcessing Products, Inc., 4565 E. Industrial St., Building 7K, Simi Valley, Calif. 93063, or call (805) 522-8147. □*









**“**It's 6:33 pm. The lines are down. And she's the closest thing I've got to a technician.

Meanwhile, I've got a sales guy here waiting to close a half-million-dollar deal, and he's screaming 'why didn't my order go through.' I have no clue. My technical staff is home watching the game. And all I keep thinking is whatever happened to that word reliability? If I could have anticipated the problem, at least I would have had a chance. As far as I'm concerned, somebody at headquarters better start talking to AT&T about getting a network management system. Or they can find themselves a new whipping boy.

**AT&T comes through.”**



### AT&T DATAPHONE® II Network Management System

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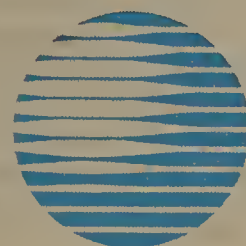
Networks of any size can be managed from a single point, so problems can be readily pinpointed and corrected.

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From equipment to networking, from computers to communications, AT&T is the right choice.

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# AT&T

## The right choice.



# Opinions

THE YEAR AHEAD

JAMES CARLINI

## To boldly go . . .

Captain's log, star date 1988.1: We are about to enter a new galaxy of telecommunications problems and solutions. Initial indications are that the members of the Federation of Telecommunications Users are not ready, nor do they understand the impact of certain alien forces. Ahead slow, Mr. User.

Some Federation members are afraid to boldly go where none have gone before. Their five-year missions should be to explore new technologies and applications, yet they hesitate due to the indecisiveness of upper management and the cowardice of their crews. Some are concerned with fluctuations in the stock market. They should look beyond these earthly barriers, seize the moment and implement technologies that can give them a competitive advantage. Competitors may already be plotting new courses to overtake them. Planning is critical.

This is also the year that the great ISDN cloud — which has loomed ahead of us for so many months without taking the shape of any recognizable life-form — becomes a living, breathing entity. Even with all of its initial allure and seduction, many members of the Federation are still leery of its capabilities. Because it will be a major offering from the Klingons of the RBHC colonies, many members believe it to be a creature of vapor and light frequencies.

*Carlini is president of Carlini & Associates, Inc., a management consulting firm in Hinsdale, Ill. He also lectures on information technology at Northwestern University in Evanston, Ill.*

In fact, the RBHC Klingons are likely to be in for a rough voyage in the next two sidereal years, as their planetary employment rates should start to drop. Many will try desperately to cling to jobs but will be let go into the vacuum of space as the RBHC colonies try to reduce the overpopulation that was easily supported in the Glut Years before Cosmic Divestiture.

With members of the Federation and planetary regulatory bodies firing photon torpedos into secret RBHC business plans, these intergalactic cable merchants may shift out of warp drive and streamline operations.

Some RBHC colonies are quietly developing products with third-party alien manufacturers. In some cases, they've started to recruit outsiders for newly formed R&D departments, gearing up to beam complete design teams aboard for future new product development. Federation members should aim for effective communications with the RBHC planets to ensure the Klingons know what users expect from new products.

In scanning other potential impact areas, it is hypothesized that the Digital Equipment Colony will also suffer heavy losses of recently boarded crew members. As quickly as they boarded the starship DEC, the new technical clones and sales drones are beginning to find a lack of access to upper command decks of the starship.

This could have several meanings for the Federation population. When the DEC exodus begins, it can only help DEC officers to get these clones and drones back into Federation ranks, where they can recommend DEC

products to new employers. Such an influx into the Federation of beings who understand the DEC product line and how to apply it to different situations could be an unexpected bonus for Captain Ken Olsen and his starship crew.

Some Federation observers think the Romulan death grip of IBM on its customers appears to be loosening. This is illogical. The Blue Being is only repositioning itself to get a stronger market grip in new product galaxies, including a Romulan favorite — the PBX Galaxy. Those who underestimate the cosmic power of IBM will fall prey to this blue giant from the planet Armonk.

AT&T is planning to add more than 1,000 sales androids next year. Federation members should make sure all shields are up before they are forced to listen to the new programmed sales pitches.

Although this log entry has focused on some stellar obstacles that may be avoidable, users must also reason with the unknown. Who knows what challenges may await us on this last frontier? As members of the Federation, we cannot sit and let others plot our courses. We cannot let vendor tractor beams pull us freely into their operations.

Captain's log, star date 1988.2: We have seen the first observations of the coming year. The next generation will reveal new insights and perhaps a passion for the unknown. It has been said that those who have the wheel, set the direction. Yet, those who have the great Vulcan vision and can see through illogical, nebulous vapor sometimes lack the power to make the decision. ☐

STANDARDS

MARVIN CHARTOFF

## The spirits of '88

In Charles Dickens' *A Christmas Carol*, Ebenezer Scrooge is haunted by the ghosts of Christmas past, present and future. But while Scrooge was able to lay these apparitions to rest in time for Christmas, net planners returning from the holidays will find themselves still haunted by the ghosts of standards past, present and future.

In the not quite forgotten past, networks evolved out of a need to provide terminal access to time-sharing hosts. Over time, the requirements have changed, but networks still include old, outdated terminals and hosts that use ancient protocol standards.

Examples include the many versions of IBM's Binary Synchronous Communications protocols, Burroughs Corp.'s Polled Asynchronous protocols and Honeywell,

Inc.'s VIP. Most of these are multi-drop, character-oriented, polled protocols that allow only the sharing of a single transmission line.

This extensive installed base of terminals and lines currently communicates with applications written specifically for a particular protocol and terminal type. It's obviously undesirable to rewrite all the applications or replace all these terminals. The network planner, therefore, must live with these ghosts of standards past.

Today's requirements must be met by existing protocols and standards. Alternate routing, switching between applications and sharing of backbone transmission facilities have driven users to the current networking standards.

These standards divide networks into wide-area and local-area networks to allow sharing of network resources within a building or across the world. Today's networking standards include IBM's Systems Network Architec-

ture, Digital Equipment Corp.'s DECnet, CCITT X.25, Ethernet and Transmission Control Protocol/Internet Protocol.

Off-the-shelf terminals and hosts are available to support these standards, but many of the products and systems are made incompatible by the differences between the standards. For this reason, network planners also find themselves haunted by the ghost of standards present. Now they can only listen, fearful but hopeful, to the whispered promises of standards to come.

The ghost of standards future brings visions of Open Systems Interconnect, Manufacturing Automation Protocol/Technical and Office Protocol and IBM's Advanced Program-to-Program Communications. These protocols are better able to support the peer-to-peer, "anything-to-anything" communications required in a world comprising different personal computers, workstations and distributed

applications.

But because these standards are familiar to the networking community but not readily available in products, the ghost of standards future haunts the network planner, who would like to incorporate the capabilities promised by these future standards.

Network planners recognize that their migration to future standards cannot happen immediately. In order to migrate to these standards effectively, a strategy needs to be developed that takes advantage of

This year, resolve to make a difference in the communications industry. Send *Network World* a column for its Opinions Pages. Columns should express strong opinions on timely industry issues. Manuscripts must be letter quality, double-spaced and approximately 700 words in length. Disk or modem submissions are preferred.

Contact Steve Moore, features editor, *Network World*, Box 9171, Framingham, Mass., 01701, or call (617) 879-0700, ext. 732.

*Chartoff is group manager at Network Strategies, Inc., a communications consulting firm in Fairfax, Va.*



# Opinions

► **TELETOONS** — By Phil Frank

Know your  
Telecommunications  
Buzzwords:  
Lesson #19

'compatible' "interoperable"



new products and technology as they become available, while protecting existing resources.

The best way to appease these spirits is to integrate all three types of standards by developing a strategic network plan. This plan must identify and document the existing installed base of equipment, how past requirements are being met and how current requirements aren't being met. It must also address potential future requirements such as electronic data interchange and distributed data bases.

The plan must then identify how to accommodate past, present and future standards through co-existence of multiple standards and gradual migration to new standards. This is done by implementing gateways, protocol converters, terminal emulation and equipment upgrades.

One key aspect of a strategic plan is to establish a backbone network architecture such as X.25, SNA or IEEE 802. The backbone network must support well-defined interfaces that are readily available for the organization's installed and planned future equipment.

At the same time, the backbone

serves as the platform on which interoperability can be built through higher level standards. The backbone network must also be positioned to take advantage of future technologies such as Integrated Services Digital Network, fiber optics and T-3.

To fend off the standards poltergeists successfully, such a plan must be truly strategic. It's insufficient to state separately some overall near- and long-term goals, specify a few procurements, declare corporate policies and develop a migration plan. These parts must be developed together, with their interdependent relationships clearly understood and documented.

It must also be updated regularly to reflect changes in requirements, technology and progress when migrating the existing network toward the organization's backbone standard.

By creating, maintaining and following a strategic plan, the planner recognizes that protocols from the past, present and future need to be integrated into a common, coherent network design. Only in this way can the network planner finally silence the haunting cries of the standards spirits. □

NETWORK WORLD EDITORIAL

## MIS can unite voice and data

Our recent *Network World* Panel of Communications Users budget survey told us a lot about spending patterns of big users. It also revealed a very significant organizational trend: More and more communications managers are reporting to MIS managers.

In our sample of 50 communications managers, more than half report directly to MIS managers. Only 10% report to general administration, which has historically overseen communications functions at many companies, just as finance departments originally controlled data processing. Eight percent of survey respondents report to a chief information officer.

Why is MIS taking control, and what are the implications? Our survey found that data expenses are consuming an ever-larger portion of the communications budget. Based on that, it's not hard to understand why top management would suggest combining its two data departments — processing and communications — under one organizational roof.

After all, data processing and data communications professionals are natural allies in the sense that both were weaned on many of the same basic technological techniques. Joining the two would hardly be precedent-setting, since, in many firms, they have always come under common control.

There are other likely explanations for this consolidation. Some ambitious DP managers eager to move up the corporate ladder see the possibility of snatching control of communications departments before communications managers are able to establish their own departmental autonomy. These DP managers recognize the growing importance of communications and the advantages of controlling it.

There's no heavy here, at least not in a general sense. MIS is not some kind of malevolent, power-mad ogre out to dominate communications managers with an iron hand, although there may be instances of that.

Moreover, some communications managers are actually eager to seek refuge under the MIS umbrella — that's where the resources are. Trying to squeeze big bucks out of general administration for strategically and

technologically justified — but expensive — projects, can be a daunting task. In that light, MIS can be a savior.

So much for data. What about the voice side of the house?

Bringing together voice and data communications departments is a sticky proposition. At some companies, it has led to internecine warfare.

Going a step beyond that and bringing voice and data under the MIS aegis creates some interesting possibilities. Under this scenario, voice and data communications people might be brought together, united in opposition to their MIS taskmasters. This, of course, assumes the worst about MIS, something we are hesitant to do.

More likely, the voice people, like some of their data counterparts, would welcome the corporate resources available to them as an arm of MIS. Some voice staffs have long been held captive to other departments that regard them as little more than cost centers, and a move to MIS could make them part of a team that much more fully utilizes and appreciates them.

Of course, what it gets down to is "adapt or leave." That being the case, the best approach is not just to adapt, but to seize the opportunity and prosper. Take those corporate resources and run for pay dirt.

Most MIS managers are busy managing the DP function. They have little time to become experts in data and voice transmission techniques and services. The voice or data manager that can explain these arcane subjects and their usefulness is virtually guaranteed to become a valued resource.

Voice and data managers that can get *together* and propose integrated solutions to corporate information needs stand twice the chance of getting ahead. Such a union could promote the good of these previously separate groups far more than any positions they might assume by themselves.

Voice and data departments have been separated for far too long. Bringing them together under MIS control will produce a synergistically powerful coalition that holds immense strategic potential.

There are many gains to be made in a time of change. Now, it appears, is such a time. □



## Features

January 4, 1988

# Handing down the laws

User RFIs and RFPs are gaining in size and stature.

**BY PAULA MUSICH**

Senior Editor

Many of the procurement documents delivered to vendors by today's corporate buyers are of almost biblical proportions. While they may not command quite the respect accorded Moses by the Israelites, users are demanding that all the inscriptions in their requests for information (RFI) and requests for proposal be taken seriously by vendors.

The specific commandments laid down in RFIs and RFPs, and the purposes for which they are used, vary greatly from organization to organization. In the view of Tom Krpata, director of consulting and education for Connections, a consulting and software firm in West Bridgewater, Mass., RFIs are most appropriate "when lots of approaches exist for solving a particular problem. They're also useful in high-risk situations where the project involves a greater dollar amount," he says.

Where the approaches are more limited and the technology that exists to solve a particular problem is more mature, RFIs are used less often as a pre-RFP information-gathering tool. One such area is the private branch exchange market. "RFIs are used less frequently in the PBX world because people are pretty comfortable with what's out there in the market," says Jack Bindley, regional manager in the Denver office of Telecom International, Inc., a consulting firm.

The opposite is true in the local-area network market. "There are still a lot of people who don't know what's available in the local net market," Bindley says, "and there are still a multitude of small, growing companies."

For local net resellers, responding to RFIs can be a losing proposition. "People are asking you to look for information for them — to

do their research for them. If they want a lot from you, do you call that a consulting service and charge for it?" asks Robert Putignano, president of Access Data Products, Inc., a value-added reseller in Mt. Vernon, N.Y.

Some RFIs are issued more for show than to learn what the market has to offer. "The RFI is used to show management that the project people have canvassed the industry, but usually there's a preconceived notion of which vendor will get the contract," says Frank Dzubeck, president of Communications Network Architects, Inc., a Washington, D.C. consulting firm.

Many users are beginning to look for more specific information about vendors' corporate health in RFI responses. "We look at financial stability, product lines and a company's ability to provide long-term maintenance. We try to cover all the bases," says Michael Grunder, director of communications for Yale University in New Haven, Conn.

One user at a large Northeastern bank says her firm is using RFIs more frequently — in place of RFPs. This move is intended to add flexibility to the vendor selection process. Also, because RFIs are less formal than RFPs, the bank feels that basing its procurement decisions on RFIs discourages vendors who lose the contract from pursuing lawsuits.

Most large users, however, still favor RFPs. To vendors' dismay, many RFPs define every aspect of a desired system in excruciating detail. This indicates a user trend toward demanding more complete solutions for a communications problem, according to Judy Estrin, senior vice-president and general manager of the Bridge Communications, Inc. division of 3Com Corp.

## Government procurement issues

The trend toward larger RFPs is

true especially of government agencies. "It takes at least two years to procure anything in the government. And because its procurements are so painfully slow, the government is tending toward larger procurements," says Jeff Held, a principal in the consulting firm Network Strategies, Inc. in Fairfax, Va. "There have been lots of omnibus contracts that call for everything from soup to nuts."

Many government bids going out now are seeking contracts for a wide range of products and services that will cover up to nine years. "These government users are essentially issuing a wish list in their RFPs, because they won't have a shot at it for another eight years," Dzubeck says.

Government communications procurements frequently include both data and voice capabilities in one package. "A few years ago, our data requirements were not as extensive," says Jack Heinsohn, director of telecommunications for the state of New York. "We're not just buying a plain vanilla phone system anymore. Now we're looking for PBXs that can serve as office data controllers, and we're looking for different products to enhance office productivity. Our tendency is to bundle more things together," he says.

Vendors, in responding to large government procurements, typically work together in teams. "Bidders have to have a complete product line when negotiating agreements," Dzubeck says.

But while such vendor teaming for specific RFPs is common in the public sector, it is not yet typical in the private sector. "In the commercial world, strategic alliances are a part of the vendor's overall marketing strategy, rather than being specific to an RFP," Held says.

Bridge Communications' Estrin  
Continued on page 26



# Management Update: Negotiating with vendors





From page 24  
predicts that systems integration firms, which have historically focused on government bids, will begin bidding on more commercial contracts in the near term. Indeed, Novell, Inc.'s national marketing manager, Dirk Christiansen, says his firm has recently begun working with large systems integrators, including Troy, Mich.-based Electronic Data Systems Corp., on RFP bids.

**Enlisting consultants**

In developing complex RFPs, users are increasingly turning to consultants for aid in dealing with all the intricacies of the procurement process. Particularly for users who lack a seasoned team of profession-

als familiar with the technology being sought, consultants can help avoid problems after an installation is completed. "When you're talking about a lot of money and unproven technology, you need people who know their way around the business — to protect yourself," Held warns.

"Unless you have a qualified staff, you should have a consultant working with you on a large-scale project," says Yale University's Grunder. "A good consultant will bring in an outside perspective, remain unbiased, give you extra staffing for the short term and give you some credibility."

As many users have learned the hard way, however, consultants can introduce their own biases to-

ward specific vendors, especially if they previously worked for one of the vendors bidding on a project.

**Dubious assistance**

Users who lack the in-house expertise to develop an RFP and who hesitate to pay a consultant may be attracted by vendors eager to assist in the process. Many RFPs, especially in the commercial sector, are developed with the help of a vendor that has an established relationship with the user.

"Vendors usually get involved by knowing the customer a long time. Often there's an installation somewhere in the company," Christiansen says. But vendor-developed RFPs are easily spotted by the competition: They tend to em-

phasize capabilities unique to the vendor or features marketed most heavily by the vendor.

"The only way to win an RFP is to write your own," Christiansen says wryly.

Users who unwittingly write an RFP with a slant toward one vendor may not end up with a network that best suits their needs. But, more importantly, they may also find themselves facing legal challenges from the losing vendors, especially in high-stakes government contracts.

"People get sued a lot, especially in government contracts, when an RFP is 'wired,'" Krpata says. Users can protect themselves from lawsuits by eliminating ambiguities in an RFP, according to Heinsohn.

Grunder says he avoids problems by providing all bidders with any changes or clarifications made to the RFP document, answering all their questions, applying all changes or delays in the schedule to all and thoroughly documenting the reasons for rejecting candidates.

Once candidates have been narrowed down to the final choice, the winning response to an RFP in government projects often becomes part of the final contract. By contrast, users in the commercial sector almost always negotiate separate contracts.

If the RFP is thorough, with everything expected of the vendor and the user fully documented, the contract negotiation process shouldn't yield any surprises. "We get as specific as possible in the RFP so that the contract negotiation process is simpler," Grunder says. Grunder's team also keeps interest alive after the vendor selection is made by dictating second and third choices. These vendors are still in the running until negotiations with the selected vendor are completed.

In negotiating terms and conditions, Merrill Lynch & Co., Inc., like many other large firms that frequently put out large bids, assembles a team of its own lawyers and technical experts to strike the best deal for the best products and services. "Our technical people look at the product offerings, and the lawyers look at finance and terms and conditions to come up with a good, joint package," says Mike Morse, assistant vice-president in Merrill Lynch's telecommunications division.

But successfully using such teams requires a great deal of finesse, according to Dzubeck. "There's a very fine line you have to tread in trying to come up with the best business deal together with a good technical product. It's a sport for some people, but in Washington it's an art form."

Communications system selection and acceptance procedures are becoming more sophisticated and detailed as communications technology itself becomes more complex. Correspondingly, users willing to invest more in the procurement negotiation process stand the best chance of making sound procurement decisions. ■

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# Bandwidth bottlenecks

Tomorrow's applications are squeezing today's networks.

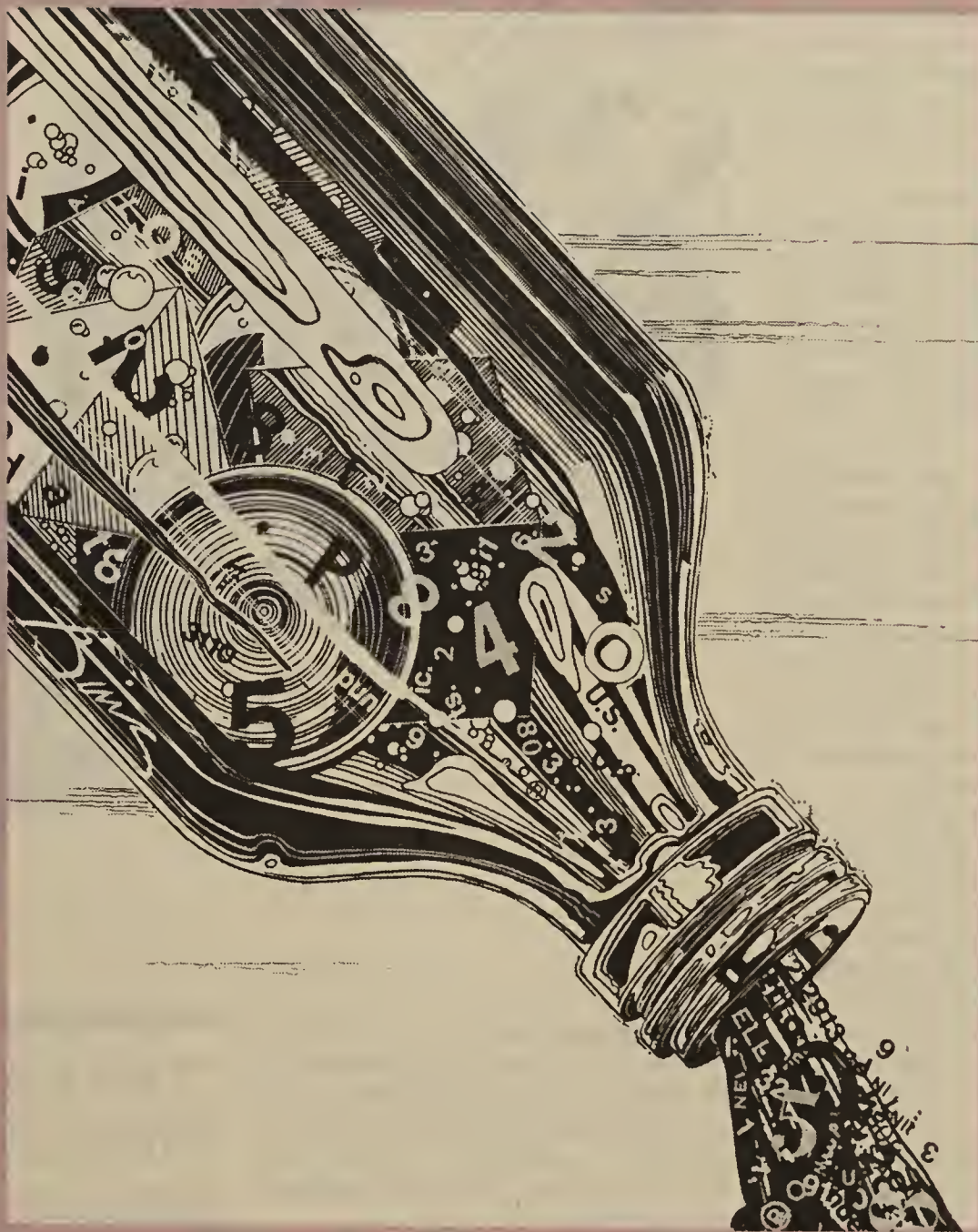
**Continued from page 1**

example of an advanced resource requiring greater bandwidth than many users have available today.

"Like the Yellow Pages, where you let your fingers do the walking, you want to let the application do the network walking, searching out the data you want. As a result, you get higher stress on the cable," says Mark Leary, program manager for communications technology services at International Data Corp., a market research firm based in Framingham, Mass.

Some technology exists to alleviate this bottleneck. Data compression is one approach that's already well-developed for video networks and probably holds a great deal more potential for both video and graphics. Super high-capacity transmission media such as fiber-optic cable will be key to supporting transport demands.

In the near future, protocols will be developed to govern wideband Integrated Services Digital Net-



works carrying voice, data and video at 135M bit/sec. And powerful network switches combining the efficiencies of packet switching and the bandwidth advantages of circuit switching are on the

drawing boards.

But before any of these technical balms can ease the strain, users must know where the constrictions lie and what's causing them.

Continued on next page



From previous page

Graphics, video and cooperative processing are three major culprits behind the demand for more network bandwidth.

#### Graphics

"Business graphics are now part of the core of a presentation in the average business meeting," says

sible for a user at a workstation to have the entire image shipped to his workstation, work on it and then ship the entire image somewhere else," Larrea says.

"It's just too much information. It takes too long, and it requires the workstation to have a lot of disk storage to store the working set of images," he adds.

"In many environments today, the network becomes the limiting factor, with respect to the ability to display high-performance graphics," says Paul Bemis, senior product marketing manager at Apollo.

Michael Weiss, senior analyst at the Santa Clara, Calif.-based consulting firm Infonetics, Inc. In addition, he says, the images themselves are becoming more sophisticated, are being used in more applications, and most important to the network manager, are being shifted among workstations more often.

The result is pressure on the network. "In many environments today, the network becomes the limiting factor, with respect to the ability to display high-performance graphics," says Paul Bemis, senior product marketing manager for high-end workstations at Apollo Computer, Inc.

The reason, as any graphics whiz can tell you, is that creating a screenful of graphics requires much more data than creating a screenful of ASCII data. High-resolution raster images are made up of millions of tiny points called pixels. To increase the resolution, the number of pixels or lines per screen, and thus the amount of data, must be increased.

Bemis gives the example of a single screen of pixels on a display showing relatively good resolution, 1,024 lines by 1,024 lines, with a pixel depth of eight bits: That's roughly 1M byte of information. It takes one second to get that 1M byte across an Ethernet that supports 10M bit/sec, if the user has access to the full bandwidth, Bemis says.

To get any kind of movement on the display, say for graphics animation, a speed of at least 10 frame/sec is necessary, which means 10M byte/sec, or 80M bit/sec. And extremely high-resolution graphics for print-quality images can require more than 50M bytes per image, according to J.J. Larrea of Computer Graphics Laboratories, Inc., a subsidiary of the New York Institute of Technology's Computer Graphics Lab.

Color graphics don't necessarily require more data, but conventionally, pixels indicating colors instead of the smooth gray scale have a pixel depth of 24 bits rather than 8 bits. "We're using Ethernet as a physical communications medium, but we've found it's not fea-

Two-dimensional business graphics in which low resolution is acceptable, such as bar charts used at sales meetings, use a less data-intensive imaging technology known as vector- or object-oriented graphics.

With this method, lines and colors are mathematically described for transmission across a network and converted to pixel-based raster graphics only on their final display. A simple bar chart might absorb 500 to 2.5K bytes of data.

Engineering graphics used in computer-aided design and manufacturing are perhaps the most widely used of the resource-intensive graphics.

"The CAD/CAM environment is where you're really seeing the first generation of bandwidth-hungry applications," says IDC's Leary. Engineering graphics on CAD workstations typically absorb 5K

to 50K bytes of information.

The U.S. Navy has a large data base of mechanical drawings and no efficient way to transmit them, says Mary Johnston, senior consultant at BBN Communications Corp. in Cambridge, Mass.

"There are so many bits in these things, they can't run them over the Defense Data Network because it would take a day to do it," she says. "So they end up either using an express parcel service or some equally horrible low-tech thing."

#### Video

Digitized, uncompressed, full-motion video requires approximately 90M bit/sec for transmission. By skipping every other frame and implementing a variety of compression techniques, the bandwidth required is cut drastically.

Thus, video continues to find

ternally for employee meetings and externally to relay crucial information to market analysts and investors. The New York Power Authority will implement a video network this winter to monitor ice floes that threaten to block turbine intakes on dams in New York rivers.

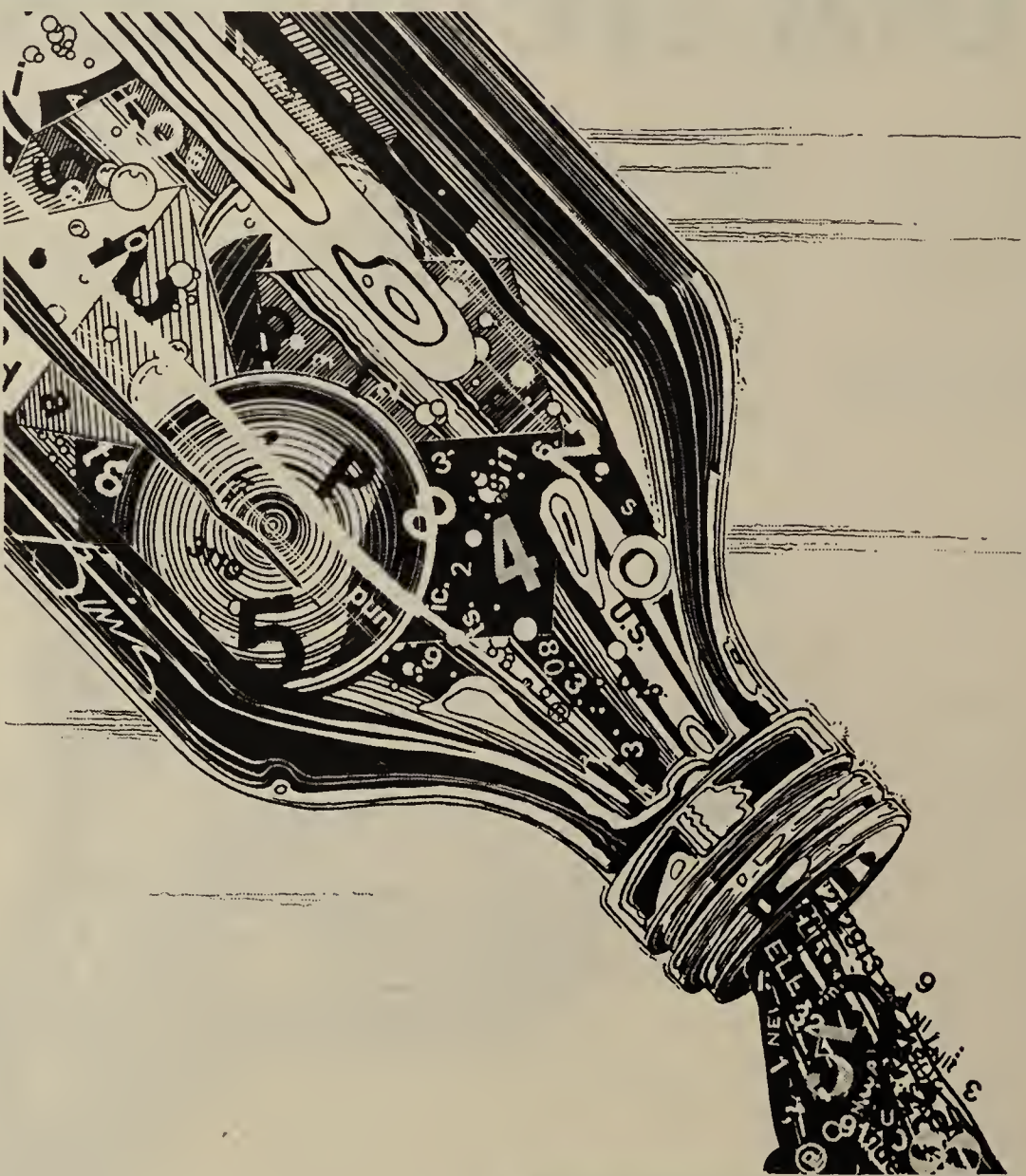
The cost of video transmission lines depends on how important the quality of the image is to end users, according to David Belove, marketing manager at Compression Labs, Inc., a video equipment vendor. Users can choose their equipment for lower cost (and lower resolution) or higher cost (and higher resolution). "If it's desktop video, you could get away with 56K or 112K [bit/sec]. If there will be two or three people, you'd probably want to go at 112K to 384K [bit/sec]," Belove says.

Low-bandwidth coder/decoders marketed by Compression Labs form images with 240 lines on a screen, while the company's high-bandwidth coder/decoders provide 480 lines. Standard television uses 512 horizontal lines across the screen to form its image. High-definition television, offering high-quality screen resolution, uses a standard of 1,125 horizontal lines.

#### Cooperative processing

Cooperative processing, a technique pioneered for use at large financial services companies, is gaining popularity in a range of environments. In cooperative processing, large tasks are distributed among networked computers. Computer Language Research, Inc. (better known as CLR Fasttax), a data processing service bureau based in Dallas, uses it for tax return processing. In the past, the company ran such tasks on mainframes, but now it distributes them among personal computers, according to Todd Pierce, manager of teleprocessing systems at the company.

IDC's Leary says the time for cooperative processing is now. "Anybody who's not looking at it or doing some internal development work — or not using it — is well behind the times. I would guess that not one brokerage on Wall Street hasn't looked at some appli-





## Solutions for the local area

Vendors offer several approaches to handling the problem of limited bandwidth on local nets. Data can be compressed to run over existing media, or the network media can be replaced with a high-capacity fiber-optic system. In addition, users can minimize the amount of network traffic by storing data on file servers.

Computer Graphics Laboratories, a manufacturer of computer graphics workstations, uses the last of these approaches to provide users with an efficient way to access super high-resolution raster graphics of up to 8K pixels wide and 5K pixels high.

"We keep the full image on a centralized file server and pass small portions of the image back and forth between it and the workstation so that it's not apparent to the user at the workstation," Larrea explains. "To do that, we send across approximately 1M byte [of data]. If the user wants to work on a different portion of the image, we swap them." Typically, Larrea might transmit one-fortieth of an image, which takes about 45 seconds. The full image might take about 20 minutes.

But for both graphics and video, data compression remains an essential technique for packing more information into smaller spaces. "In order to get any kind of serious bandwidth out of a network, you have to do some kind of compression," says Apollo's Bemis.

Compression of both raster and vector graphics data involves putting them through a compression algorithm running on specialized hardware and software. At the receiving node, an inverse algorithm decompresses the data. Unless the circuit's protocols are set up so that the compression process takes place simultaneously with transmission, a time delay is introduced.

For digitizing and compressing video signals, video equipment manufacturers such as Compression Labs and the Peabody, Mass.-based PictureTel Corp. have a variety of specialized coder/decoders on the market. "The benefit of compression is that it dramatically reduces the cost and bandwidth required to send video signals," says Compression Labs' Belove.

Most video coder/decoders use a mixture of three compression techniques, Belove says. Interframe coding looks at successive frames to compare how the image has changed and then transmits only data that has changed from the previous frame. Intraframe coding examines the content of a single frame, decides what areas are alike within it and sends summary instructions for those areas of the frame. Finally, motion compensation uses an enhanced interframe coding technique to describe how objects have moved between successive frames.

Compression and file servers are important, but they cannot compete with the high bandwidth offered by fiber. The Fiber Distributed Data Interface (FDDI), an ANSI-developed standard for fiber-optic local-area networks, permits

# Data compression is an essential technique for packing information into smaller spaces. "In order to get any kind of serious bandwidth out of a network, you have to do some kind of compression," says Bemis.

speeds of 100M bit/sec and a maximum cable length of about 100 km. This far surpasses the 10M bit/sec offered by Ethernet, the 4M bit/sec offered by IBM's Token-Ring Network and the 12M bit/sec offered by Apollo's proprietary token-passing ring.

Expectations for FDDI are high. "It should resolve the problems we see today associated with bandwidth constraint," says Apollo's Bemis. IDC's Leary agrees. "Compression is a great technique, and certainly it's been used all over," he says, "but why invest in higher level services when they'll inherently limit the performance of higher level applications?"

"No matter how fancy you make your compression algorithm, it's going to impose a much smaller theoretical limit [on throughput] than a medium like fiber."

## Solutions for the wide area

The transmission rates for optical fiber achieved in research laboratories have far and away outstripped the ability to process data, according to officials at Bell Communications Research, Inc. These technologies are expected to be implemented in the networks of both local and long-distance carriers, beginning in the early 1990s.

To support these wideband networks, a new generation of high-speed switches will be developed, according to BBN's Johnston. Leveraging the bandwidth advantages of the former and the inherent efficiency of the latter, the switches will be equipped to handle the 135M bit/sec ISDN standard known as H4. The Consultative Committee on International Telephony and Telegraphy is expected to recommend H4 in 1990.

BELLCORE engineers are working on a plan to provide users with 150M bit/sec fiber access to networks under a standard known as Synchronous Optical Network (SONET). While the CCITT Study Group XVIII and ANSI T1X1.5 committees are working to finish a SONET interface specification, at least one vendor, Herndon, Va.-based Licom, Inc., is already "beginning advanced development on SONET-compatible equipment," according to a company spokesman.

SONET will be a synchronous protocol that breaks data into blocks called cells. These cells will be used instead of packets because they will be much smaller than conventional packets used in local nets. Packets typically contain as much as 8K bytes of data, while cells may be limited to as little as 100 bytes, according to Stephen

Walters, division manager of advanced network technology at BELLCORE. The small cell size is the key to gaining the advantages of synchronous packet technology.

"Breaking the 150M-bit channel into cells gives great flexibility, and it still has the advantages of synchronism. That is, because the cells are of a fixed length and always occur, you are able to employ circuit techniques that are able to keep up at these high speeds," Walters says.

The SONET-governed cell networks will simulate a circuit-based connection for existing T-1 and T-3 equipment, Walters says. Interfaces will be developed to ensure

that installed private branch exchanges and other customer premises gear will be adaptable to the new access arrangements, he says.

BELLCORE foresees the 150M bit/sec access leading to new shared exchange locations called remote electronics modules. The modules themselves will be linked with fiber at even higher, as yet unspecified speeds.

Walters outlined four classes of new service BELLCORE expects will arise from the new networks:

- **Connections between local-area networks.**
- **Video.**
- **Cable television distribution for cable service providers.**
- **Packetized voice services.**

Walters forecasts trials in the territories of all seven regional Bell holding companies in the early 1990s.

Medium-scale deployments are expected in the middle to late 1990s, and large-scale switching is not expected until the year 2000.

Until then, users will probably continue to battle bandwidth bottlenecks. In the absence of available technological solutions, they may find new ways of their own to speed data transmission. ▮

# Letters:

Editor:

An Aug. 24 *Network World* article on the John Hancock Mutual Life Insurance Co. communications network contract recently won by AT&T ("AT&T wins Hancock net deal") contained some statements that New England Telephone & Telegraph Co. believes may leave readers with some misperceptions relating to Centrex.

First, the suggestion that New England Telephone — and not the end user — determines when new Centrex features will be introduced is not really accurate. Today, our company and other suppliers in the telecommunications marketplace must be as responsive as possible to specific customer needs. To that end, we have two new procedures: a special contract/design option (which allowed us to satisfy the request for proposal issued by John Hancock) and a special assembly process that allows us to satisfy unique requirements for individual customers.

In fact, we have done more than 100 such special system designs for customers in the past 15 months — illustrating our willingness to respond to sophisticated and unique end-user needs.

Secondly, it is not accurate to say that New England Telephone would wait until many Centrex customers wanted a new feature before introducing it. We have recognized the urgency of anticipating customer needs and have changed our approaches accordingly.

A third issue raised in the article indicated that under a New England Telephone scenario it would cost about \$2,000 to move two telephone stations. This cost would be associated with the terminal equipment or station sets and not with the lines. An analysis of our tariffs indicates Centrex-related charges of well under \$100 for these moves.

Finally, I would like to stress to *Network World's* readers that Centrex is New England Telephone's flagship product and can be designed to meet specific customer needs. We are not too big to respond to individual customer needs. Rather, we like to think of our size as an asset: We're big enough to handle any customer need we face.

Philip Richer  
Division manager  
Centrex marketing  
New England Telephone & Telegraph Co.

Editor:

Thought I would take the time to let you know what a fine job you are doing with *Network World* from the point of view of an industry participant. I am particularly pleased with your Opinions pages and am indeed impressed with the perspectives and insights provided by Alan Pearce.

Keep up the good work.

Frank G. Splitt  
Vice-president  
Technology planning  
Northern Telecom, Inc.

*Network World welcomes letters from its readers. They should be typed, double-spaced and no longer than 150 words. Letters may be edited for space and clarity.*





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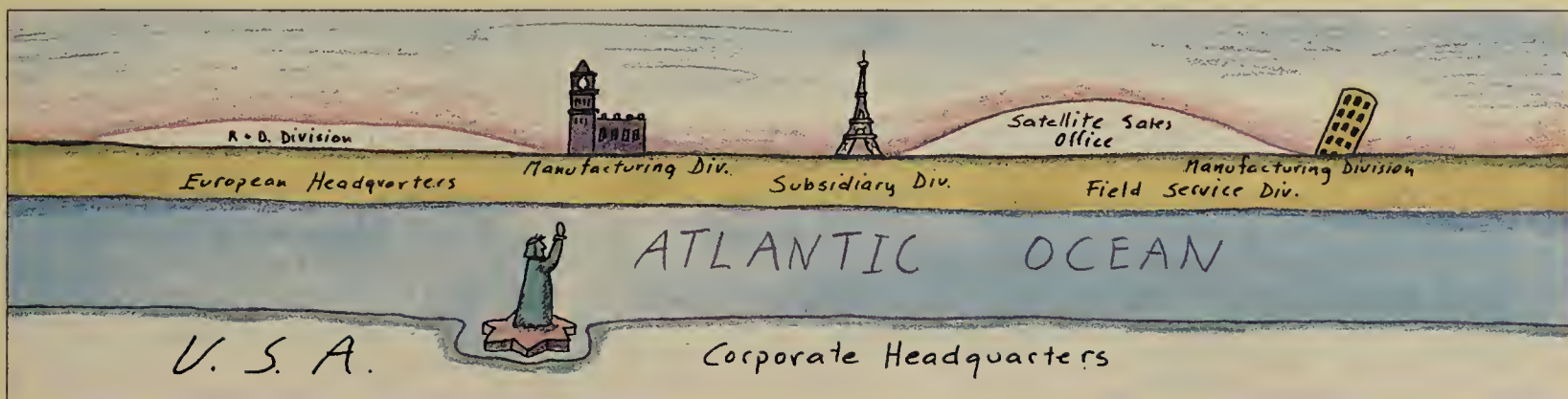
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# CASE



## INTERNATIONAL NETWORKING

# Linking the global corporation



As companies expand into worldwide markets, communications becomes key to competition.

**BY RAYMOND T. BUTKUS,  
MATHILDE BENVENISTE  
AND RICHARD W. ROSS JR.**  
Special to Network World

Isolationism is dead not only as a foreign policy but as a corporate economic growth strategy. Today's corporations are becoming increasingly multinational and often global in nature.

*Butkus is deputy director of international market management at AT&T in Morristown, N.J. Benveniste is a member of the technical staff at AT&T Bell Laboratories in Holmdel, N.J. Ross is director of marketing and technical support at AT&T Communications, Inc., European division, in Brussels, Belgium.*

As these companies face more effective competition, they must skillfully use every strategic weapon at their disposal. The weapon of choice for many is an international private network.

Corporations in many different industries are finding that their ability to manage information on a global scale can be enhanced greatly through use of an international private network. Retail businesses such as Harrods Department Store in London and Galeries Lafayette in Paris are using international toll-free numbers to increase the reach of their distribution and marketing channels.

Many international financial concerns, such as Barclays Bank plc, are developing new business opportunities overseas by taking

advantage of around-the-clock trading networks.

Multinational petrochemical firms are becoming more adroit at spot trading and physical distribution logistics with the aid of specialized international networks.

In addition, several multinational manufacturers are using computer-aided design and manufacturing technology over high-speed digital links to lower production costs and improve product design, while the companies take advantage of geographically dispersed computer models.

## Planning

An international network should be the result of a series of preplanned and thought-out steps;

Continued on page 33



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## NETWORK WORLD

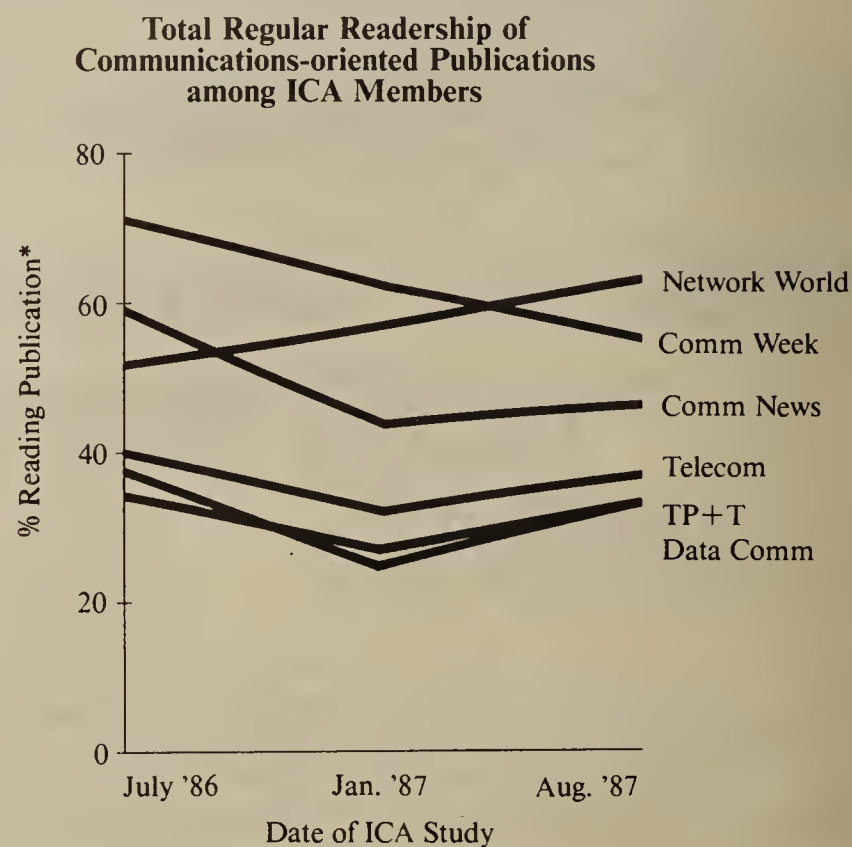
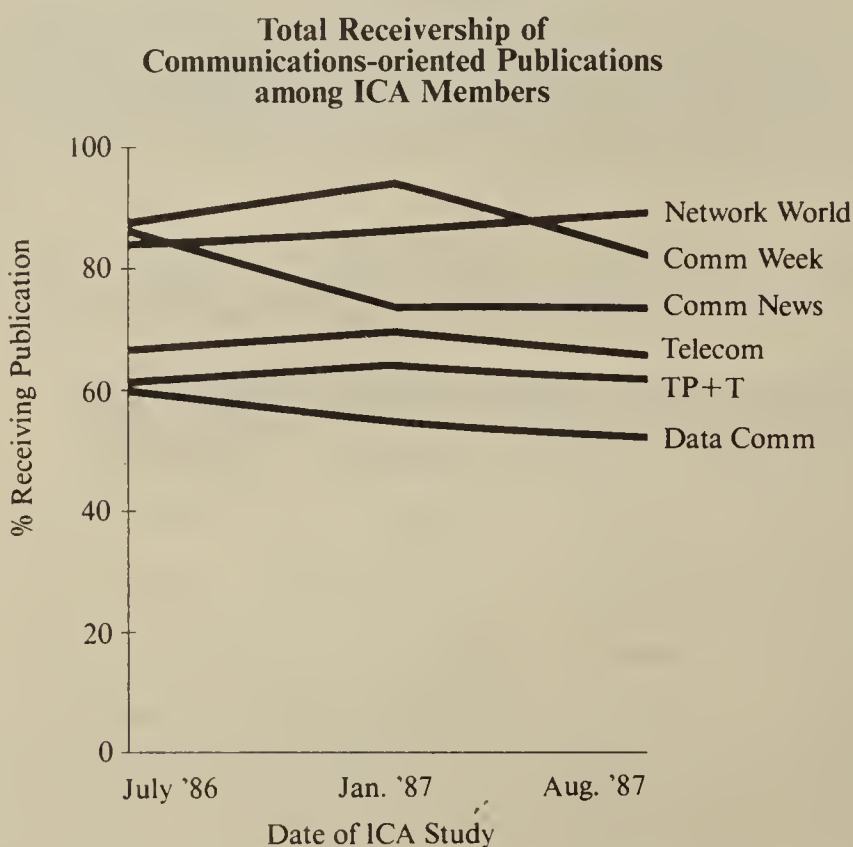
Gary J. Beach  
Publisher

"Rome wasn't built in a day." Although you've heard this saying time and time again, the philosophy behind it — that through hard work you can make things better day by day, week by week, and year by year — remains sound.

It's this very philosophy that *Network World* editors have followed during the past 18 months. And in doing so, they have remained true to their initial goal: to make each issue of *Network World* the best possible for you, our readers.

Evidence is growing that *Network World's* long-term commitment to editorial excellence is paying off. In fact, the latest study conducted by an independent research firm among ICA members shows rather impressive results. Not only does *Network World* top the list of communications-oriented publications in receivership, but it now ranks number one in readership as well.

As you can see in the following charts, both receivership and readership of *Network World* among ICA members have steadily increased since July 1986. However, during this time period, these same ratings have declined for almost every other communications-oriented publication.



\* Readership figure for each publication is based on the number of ICA members who receive that publication.  
Studies conducted by First Market Research of Boston.

There's no question about it. *Network World's* in-depth networking coverage is what enables us to deliver a unique editorial product that progressive communications users have come to rely on week after week.

Thanks to the growing support of ICA members and continued dedication of all our readers, *Network World* is now the number one communications-oriented publication for today's leading-edge users.

Cordially,

Gary J. Beach  
Publisher

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An IDG Communications Publication



From page 31  
it shouldn't simply evolve. Application of several key principles will ensure development of an efficient international network that will support the corporation's business strategy and enhance its ability to compete in global markets.

Often, the planning phase of international network development receives inadequate attention. This can be fatal since cost, design, implementation and utilization factors make these networks considerably more complex than their domestic counterparts. Therefore, at the start, it's imperative to assemble the strategic business criteria and operational factors that will form the basis for a project business case.

For example, a checklist of operational factors might include the following:

■ **Company demographics.** This includes lines of business; functional lines (marketing, manufacturing and finance); and geography (countries and affiliates).

■ **Resources.** This includes technical expertise; existing network facilities; and budget.

■ **Performance objectives.** This includes availability; restore time; and reliability.

These operational aspects are fairly obvious, but they are rarely evaluated in terms of their project impact before the design phase begins.

Strategic criteria, less frequently considered, must also be identified and evaluated. These criteria can be translated into critical applications that lead to information-intensive solutions.

After identifying critical applications and prioritizing operational objectives, the manager must develop a business case for the project. It should be a sound presentation that formally establishes a measurement of success and project accountability.

#### The design phase

Upon senior management's acceptance of the international network project, the design phase begins. There are three stages in this phase. The first is data collection and input preparation. Stage 2 comprises the computations that determine the optimal network parameters, such as network topology, link capacity, transmission services to be leased and routing of traffic. The final stage is the cost-allocation process, which must equitably distribute the cost of the proposed network among the company's decentralized divisions.

■ **Data collection.** Data collection can't be carried out effectively without a clear picture of the design methodology to be used. Conversely, the availability of data will influence the choice of design methodology. For these reasons, the two tasks may overlap. The designer obtains the needed data and shapes the computation methodology. This should be achieved through a sequence of information collection steps that involve both questionnaires and on-site visits.

Information requirements include gathering data on the corpo-

ration's point-to-point telecommunications traffic. The traffic may include a variety of applications, such as voice conversations, electronic mail, interactive computer data and facsimile.

Collecting this data is more complex with international networks. With domestic networks, peak-hour traffic data is often sufficient for accurate data collection. However, when dealing with traffic on a global scale, users must collect data over a 24-hour period.

This is complicated further because traffic data must be collected in several countries, and the level of detail in telephone company records differs. Many Post, Telegraph and Telephone administrations provide insufficient detail for network design purposes.

Because of this varying quality of detail, a well-planned questionnaire with follow-up interviews and visits is necessary.

## International networks are considerably more complex than their domestic counterparts.

Current and-future traffic data must be collected. Since a dedicated network will involve capital expenditures — typically for customer-premises equipment — the design should be done on a planning horizon comparable to the economic life of such equipment.

However, since planning is done on the basis of projected worldwide policies, economic conditions and technological innovations, such projections are uncertain. Therefore, the flexibility of the network design must be checked. Offering a variety of migration alternatives to the future network will produce the desired flexibility and reduce premature equipment obsolescence.

Next, the previously identified corporate goals must be incorporated into the design. These might require that different mathematical formulations be used to design a network for a corporation that wants to minimize its total telecommunications bill, for example. This priority may be higher than maximizing the traffic throughput of a planned or existing dedicated network to accommodate growth.

In the same light, when a corporation's demographics call for the use of a certain location as the major network hub, one must be able to account for this explicitly in the computations.

A third aspect of the data preparation process is collecting information on the network services offered by the PTTs and the customer-premises equipment that's approved for use in the countries of interest. Given the wide variety of services and equipment available in different countries, this task will require a well-designed questionnaire and follow-up local-site visits.

Additionally, regulatory issues can greatly affect a network de-

sign and shouldn't be overlooked during data gathering. The designer should be aware of national regulations in each country regarding the transfer of certain types of data out of that country.

There may also be constraints in terms of privacy, national security and specific industry regulations. Regulations relating to restrictions on services in the country must also be considered. For example, in many countries, shared private lines and off-network traffic are illegal.

■ **Design computation.** International dedicated network design is a complex computational task that requires the use of sophisticated operations research models. Although this is not a comprehensive overview of this methodology, some considerations are necessary to appreciate the complexity of the problem.

In determining the network pa-

rameters, many considerations come into play. Decisions must be made about the portion and mix of traffic that will be routed via the dedicated network. At times, the public network may be more cost-effective than the dedicated network for certain origin/destination pairs and traffic types.

In order to maintain high usage on the dedicated lines, the traffic between a given origin/destination pair could be split between the two networks. Some traffic would go to the public network as a result of overflow from the dedicated network. Other traffic would flow directly to the public network. This would occur either because no dedicated network path exists to connect the origin to the destination or because the circuits on such a path must be kept free to carry traffic in the opposite direction.

The need for direction-specific routing arises in international networks because public network tariffs depend on the origin of the traffic. Rates could, therefore, be very different for traffic carried in opposite directions. Finally, care must be taken to design for enough capacity to carry traffic in an acceptable performance range.

International network design is complicated further by the noncoincidence of business hours. Though this is usually perceived as a problem, it can have some redeeming effects.

The noncoincidence of business hours in cities around the globe causes peaks along different routes at different times. Although these high peaks may discourage the use of dedicated services along such routes, the noncoincidence of the traffic peaks on different routes provides the means by which dedicated services could be made cost-effective.

An example is a brokerage firm

with offices in cities with important financial markets, such as New York, London, Singapore, Tokyo, Sydney, Australia and Zurich, Switzerland. The time zone differences from city to city around the globe shift the overlapping business hours when trading — and, consequently, voice traffic — occur.

By reconfiguring the network in the course of the day, the company can increase use of one link, such as the Sydney/New York link. This can be achieved by having the link carry the traffic between various pairs of cities, such as between Hong Kong and Zurich or between Singapore and London at different times.

Knowledge of the time profile of traffic provides an additional benefit. Throughput is increased on a dedicated network by using idle capacity during low-usage periods for off-peak applications, such as low-priority electronic mail or computer batch jobs.

The same channels could be used at different times to move traffic as diverse as voice conversations in circuit-switched mode and interactive computer data in packet-switched mode.

#### Cost allocation

After obtaining a detailed network design that shows how a dedicated international network will benefit the corporation, it is necessary to ensure its acceptance by managers of the company's decentralized divisions, as well as by senior management. Since the network was designed with the goals of top management in mind, the design is likely to win their acceptance. Middle management may object, however, as their goals differ from those of top management.

Consider, for instance, the corporation that evaluates divisional management on the basis of each division's expenses. In profit centers, the most widely used performance measure is divisional net profit. In investment centers, where managers are evaluated not only on divisional profits but on profits relative to the fixed investment for their center, return on investment or residual income are typical performance measures.

In both instances, if the divisions are charged for the use of the shared network, their performance measures are affected. Therefore, they may oppose the new network. In this case, the manager must devise a network cost-allocation scheme that will leave the divisions' performance measures unchanged.

When several cost-allocation schemes with this characteristic are available, one can be selected based on equity considerations. For example, a division's cost share could be made proportional to the alternative telecommunications costs avoided.

The choice of an allocation scheme may also be based on criteria that contribute both to current reported profits and to the long-term profitability of the corporation. Examples of the latter include

Continued on page 35





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Dick Hichens is Senior Technical Network Analyst for ALLTEL Corporation of Hudson, Ohio. The thirteenth largest telephone utility in the United States, ALLTEL provides cellular phones, wide-area paging services, fiber optic-based phone equipment and more to customers in 19 states. Dick is involved in purchasing ALLTEL's network communications equipment.

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## Linking the global corporation

continued from page 33

the development of new technology, product quality and human resources.

### Implementation

Once senior management is convinced the project will positively affect the corporation, the implementation must be completed smoothly and on time. Almost by definition, international network implementation is a complex and time-consuming exercise because of its unique environmental and operational aspects.

For example, any given international network will have a multi-vendor character, in that it will include a variety of carriers and equipment manufacturers. Therefore, the network manager must use a disciplined system for coordinating product and service provisions.

This usually involves various order procedures, such as matching orders required on each end and establishing multiple installation intervals for the circuits and equipment.

Environmental factors have a great impact on postcutover activities, such as user training, network management and network maintenance. Time zone variances, language differences and differing levels of technical expertise are complicating considerations that are critical to the ongoing efficiency of the network.

When developing procedures and logistics to handle training,

the implementation phase because of the complexities and problems involved. However, regardless of vendor support, users must keep their own houses in order with sound project management procedures. Ideally, an official in-house coordinator should have matrix management authority and the appropriate responsibility for direction and follow-through.

Once the network has been im-

## It's still feasible to design a private network that will provide a payback in a five- to seven-year time frame.

mplementation and network management, it's advisable to organize a core team of users, vendors and telecommunications management personnel. This team should be charged with developing control mechanisms, monitoring tools and tracking techniques that are consistent with telecommunications management principles and end-user expectations.

Often, users are looking for one or several vendors to coordinate

plemented, ongoing performance reviews with senior management are appropriate. These reviews should include a summary of ongoing business performance as defined by the business case criteria and a brief summary of technical performance, using language that can be readily understood by non-technical managers.

### The bottom line

Planning, designing and devel-

oping an international private network is expensive and time-consuming. However, when done properly, a no-lose situation is created.

If the business case has been constructed based upon sound assumptions and user input, the corporation will benefit strategically when the network is implemented.

Even if the need for a private network is not substantiated, the corporation still benefits by having attained a better perspective of its global strategy and international operations. The telecommunications staff can better make ongoing adjustments to the existing network or use public switched services to support the corporation's objectives.

Increasingly, managers voice concerns regarding the development of international networks based on leased-line backbone architectures because of the trend toward international Integrated Services Digital Networks and carrier-provided software-based networks.

However, it's still feasible to design, implement and operate a private network that will provide a payback in a five- to seven-year time frame. ▀

## Industry hit by merger mania

continued from page 1

most radical transition, from a market comprising many relatively small vendors to one of several giant companies with T-1 subsidiaries and a few independents.

In 1987, Bolt, Beranek and Newman, Inc., bought Network Switching Systems, Inc. (NSS); Micom Systems, Inc. bought Spectrum Digital Corp.; Dowty Group plc acquired Datatel, Inc.; and Unisys Corp. bought Timeplex, Inc. In addition, IBM entered into a marketing alliance with Network Equipment Technologies, Inc.

Now, of the leading T-1 multiplexer makers, only Infotron Systems Corp., StrataCom, Inc. and Avanti Communications Corp. remain unattached. Analysts predict the loners will at least need to form alliances with other vendors to stay competitive in a market now overrun with Goliaths.

There were no dissenting votes in the election of Timeplex/Unisys as the best acquisition of the year.

"Timeplex and Unisys is unquestionably the long-term genius marriage of the year," said Jack Freeman, a senior analyst with Boston-based The Yankee Group. "Timeplex will point the direction for Unisys' communications development, and, if Unisys puts money into Timeplex research and development, Timeplex will be a tiger."

Joaquin Gonzalez, a vice-president with Stamford, Conn.-based Gartner Group, Inc., concurred with that analysis. "Timeplex has a new installed base to go after, and Unisys gained a T-1 multiplexer, which I believe will become the important gateway for computer vendors to control," he said.

Agreeing with Gonzalez was Jerry McDowell, chief executive offi-

cer of the consulting firm Telegistics, Inc., based in Carmel Valley, Calif. "It's significant that Unisys recognized the need to interface to high-speed lines through multiplexing on-site rather than through a carrier," he said.

While the Timeplex/Unisys team-up is universally smiled upon, Bolt, Beranek and Newman's purchase of NSS has been questioned by analysts. At the time of the acquisition, observers hailed a trend toward the integration of packet-switching and circuit-switching technology. But critics say the company chose a fledgling vendor with little to offer.

"That one's the laughter of the year," Gonzalez said. "BBN paid too much for a T-1 mux vendor with no installed base and a product just coming out of beta test. An integrated circuit/packet switch is a nice notion, but not many users are making it a requirement in their long-range plans."

Steve Levy, an analyst with the New York-based investment firm Hambrecht & Quist, Inc., said, "The only thing NSS has now is some gee-whiz technology."

Bolt, Beranek and Newman's integrated switch, if it is introduced, will give the company an edge by combining two complementary technologies, McDowell said. But, he said, the firm must learn to market more aggressively to capitalize on that strength.

In June, Micom bought Spectrum Digital, in what analysts saw as a belated move to enter the high-end T-1 multiplexer market. The Yankee Group's Freeman said Micom has built up a systems-oriented sales force that can effectively sell high-end networking gear.

Others doubt Micom's ability to sell Spectrum Digital's product. "Micom bailed Spectrum Digital out of deep financial trouble," said an analyst who requested anonymity. "Now Spectrum has the financial backing to go on, but I don't believe Micom has the strong direct sales force necessary to sell Spectrum's product."

If Unisys/Timeplex is the acquisition of the year, undoubtedly the 3Com Corp./Bridge Communications, Inc. partnership qualifies as the merger of the year.

The local net market was also marked by Digital Communications Associate's (DCA) acquisition of Fox Research, Inc., now called 10Net Communications, Inc. DCA also made an unsolicited takeover bid for Ungermann-Bass, Inc., only to withdraw when its offer was spurned.

"The 3Com/Bridge merger can't help but succeed," McDowell said. "I think Bridge offers better products and service than anyone else out there, and 3Com does an excellent job of providing local network service to the personal computer market. Bridge brought 3Com its servers, its strong software development and its ability to do token passing, which 3Com didn't have."

Doug Gold, a senior analyst with International Data Corp. in Framingham, Mass., was equally enthusiastic. "The union of these two creates a company with desktop-to-mainframe capabilities," he said. "3Com has lusted after Bridge's large direct sales force, which provides entree to big accounts, and Bridge would like to focus on the low-end personal computer market. It's a beneficial relationship for both." Gold was also optimistic about DCA's acquisition of Fox, noting that Fox has already gained a stronger presence in the

U.S. and that DCA has gained another new revenue source to ease the decline in its Irma board sales.

The VSAT community, still in its infancy, was rocked when Contel ASC swallowed up Equatorial Communications Co. and two Communications Satellite Corp. satellite equipment businesses, and Hughes Aircraft Co. bought M/A-Com, Inc.'s VSAT and packet-switching operations.

While some debate the wisdom of large companies buying up small ones — such arrangements sometimes squelch the creativity and deftness of small operations — analysts said they felt Contel and Hughes could help their acquisitions weather uncertain times in the VSAT market.

As Fritz Ringling, a principal with the New York-based management consulting firm Booz, Allen & Hamilton, Inc., points out, Contel's financial stability improved debt-ridden Equatorial's chances of survival. Ringling added, "Contel is becoming a systems integrator, and Equatorial fits well into that strategy by providing strong data and video technology."

Theodore Moreau, an analyst with the Milwaukee-based investment firm Robert W. Baird and Co., Inc., said, "By itself, Equatorial couldn't sell its products. But with Contel's marketing prowess and a broad product line that includes COMSAT's satellite products, Equatorial can succeed."

M/A-Com, too, needed strong financial backing to survive, according to Phillip Arst, president of Communication Strategies Associates, Inc. in Cupertino, Calif. "These acquisitions represent the passing of small VSAT companies into large corporate hands. Hughes is giving M/A-Com a free hand, so they should be successful." ▀



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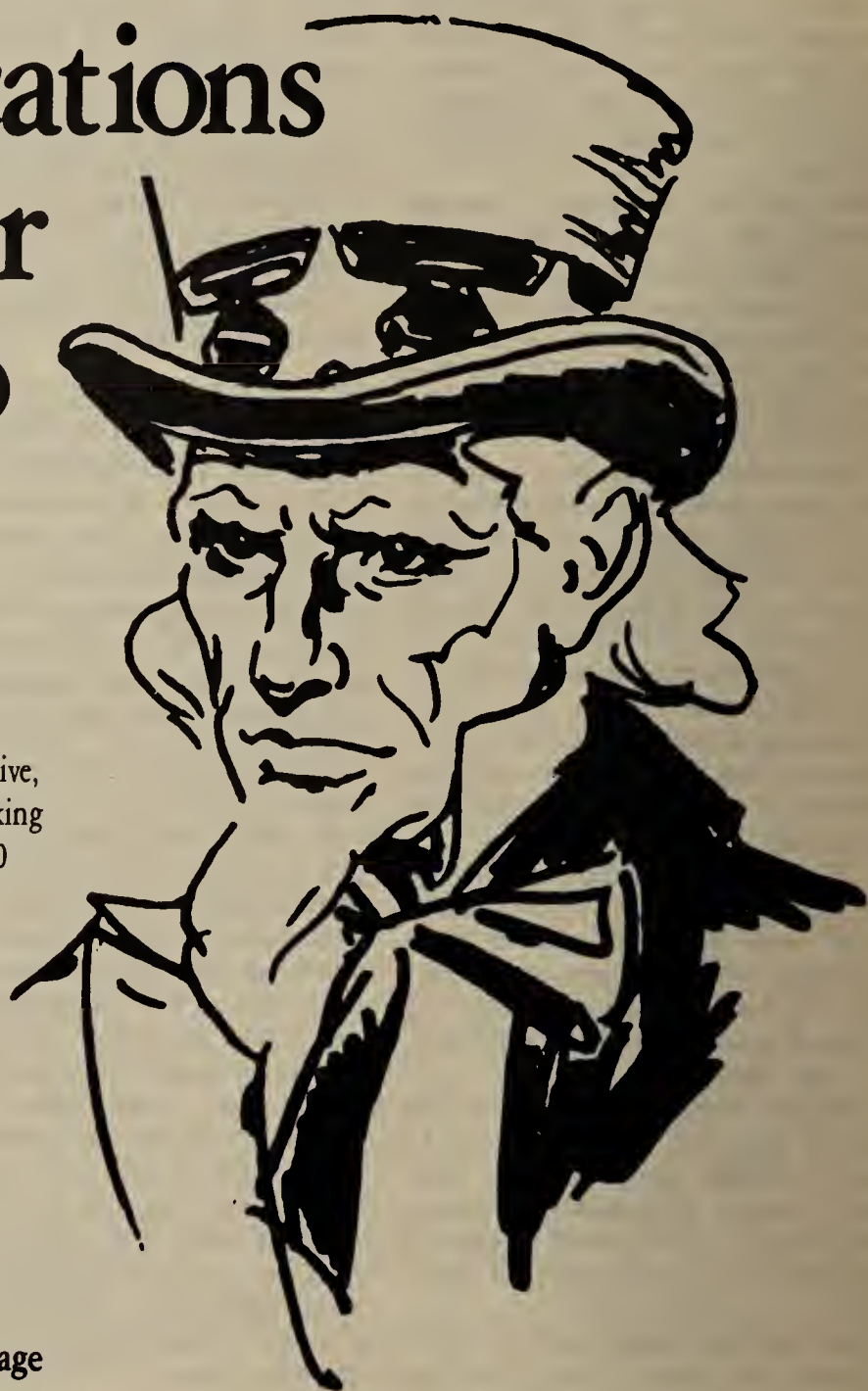
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